SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1693.—Vol. XXXVIII. LONDON, SATURDAY, FEBRUARY 1, 1868. {STAMPED .. SIXPENCE. UNSTAMPED. FIVEPENCE.

Royal School of Mines, Jermyn-Street.

Mr. WARINGTON SMYTH'S LECTURES.

[FROM NOTES BY OUR REPORTER.]

Lectures XXIII and XXIV.—The next subject Mr. Smyth brought into view dealt with the means of going down and coming up the shaft. In mines in their earlier stages, and in those conducted on a very small scale, contrivances of a very inefficient character were frequently used. If the depth was small, and the mine was worked by a downcast, access to the bottom was gained by a succession of "stopes," or steps. Many iron mines in this country were so arranged that a few steps would suffice to get down to the work and back. There was also another plan, no doubt derived from that, by which steps were cut in the rocky floor of the vein, sometimes throughout the plane of the lode itself, or the contemainous rock; and there was a convenience in this plan, when it was desirable to introduce horse-power, as the steps could be made sufficiently broad and of a moderate height, so that horses might be taken up and down. At Mostyn Mine, Flintshire, this was a very frequent practice, as it was also at lead and salt mines in various parts of the kingdom. This was a matter which depended a great deal upon the depth, an increase in which had led to considerable modifications of the plan in the Alpine salt mines, where the steps were cut with slopes between, at a moderate angle. In these mines there were inclined shafts, with steps on the side, made of pieces of timber at each step to tread on, but having also at the sides a couple of rows of rounded pine timber, upon which the miners slide down in a sitting position, shooting to the bottom with amazing velocity and perfect safety. With regard to those vertical shafts which were ascended by ladders, the smaller lead mines of the North of England used very rude methods of descent, and in many cases, in other parts of Britain, it was effected by a number of pieces of wood, projecting from the sides of the shaft, driven in between the stones of the walling. Considerable inconvenience attended this plan, as there was often a strong draught, which might extinguish the light carried by the person descending; and, then, if two or three of these pegs were worn or knocked away in succession, the miner was exposed to great peril. This plan was, however, only used in mines on a small scale. In some cases stemples were used, being placed across, at 4 ft. asunder, sometimes parallel and sometimes transversely. In winzes, where they were not more than 2 or 3 fms. long, these were very suitable, and thus the men climb up and down by the help of a cord, instead of by regular ladders—a sort of acrobat work, which left its effects on the muscles for some days. These stemples allowed a firm hold, but when they were placed where the depth was 40 or 50 fms. it was very hard work, and they were so large for the hands that those accustomed to a good ladder would not approve of them. The ordinary means of descent in most properly managed mines were ladders, when machinery was not employed for lowering and drawing out the men. Ladders of the simplest form were those in use in America, Hungary, and in some parts of the North of Europe, and it was a kind which was the most advantageously employed when blasting was going on, and when, consequently, smaller ladders would be knocked to pieces. They were made of a strong beam of wood, in which steps were cut at proper distances. Another sort, like a poultry ladder, was very often used. It was not, however, recommended where there were a great number of men. It was constructed by strips of wood being nailed across an upright beam, and placed against the sides of the shafts for a considerable height. Special care should be taken to secure the cross bars to the beam. The staves of the ladders in Saxony were usually flat, and were put through holes in the side pieces. In this country they were usually round, and made of ash, with, at the distance of every 10 or 11 ft., a strong wrought-iron bar, which held the ladder firmly together. Iron bars, however, were not as a rule advisable, and in winzes and places not often travelled through they would sometimes be found to have utterly perished, so far as strength was concerned, nothing being left but a mere crust. The distance between the staves, too, was to be considered. If they were as close as those on bricklayers' ladders no one would like them. It was usual to have them from 10 to 12 in. apart, and 11 in. was found generally to be the best space. Sometimes ladders were made of chains, they being more easily raised and conveyed from place to place. The most important thing, however, was the manner in which they were placed. In the principal part of the extensive metalliferous mines the ladders were placed from one platform to another, a system largely used, with different variations. In an inclined shaft it was convenient to place the ladder along the footwall of the lode, but not close to it, so that any rubbish falling might pass through it. The ladder should be put at an angle easy to climb in vertical shafts, although a great deal depended on the size of the opening. A great number of mines had the ladders placed so badly, that were there where considerable distances to climb the health of the men was seriously injured. The worst ladders were those resting uprightly against the walls of a shaft. An ascent and descent of 50, 60, or 80 fms. every day upon a perpendicular ladder was found to affect the heart and lungs very powerfully and injuriously, besides the risk of instantaneous death by missing hand or foot hold. The proper angle was about 75°, which a man in good health could easily use without much danger. Where the shaft was perpendicular, a system of sollars was used, by which the descent was divided. Each sollar had a man-hole, with a trap-door, so that a man would not have a fatal fall in case of accident. In several localities on the Continent very short ladders were used, not being more than 2 fms. in length, and each sollar guarded with sides. In other places 4, 5, or 6 fms. were common. The ordinary run of English mines had 30 to 40 fms. for the prevailing lengths. These longer lengths, however, were all more or less fatiguing, and in the deeper mines the average life of miners was shortened in consequence of this as much as by the bad air they breathed, so that many plans had been proposed to get rid of this labour. This had been tried by raising the men with the same ropes and chains that raised the mineral, but it was found to be too risky for the proposal to be received with satisfaction. The first step to a good solution of the difficulty was taken in Germany, by employing the pumping machinery, and it was put into practice there just at a time a premium was offered in this country by the Polytechnic Institution of Falmouth for the discovery of some unobjectionable means of lowering and raising miners. Watching the action of the pumping rod, the two observers (one in Germany and the other in Cornwall, without any communication with each other) conceived the idea that by making a foothold on the rod the miner would be drawn up as much as the length of the stroke at each stroke, when he could step off on to a platform, and then to a rod on the other side, which would just have completed the down stroke, and be ready to ascend. At first it was intended that only a few men should ride in this manner on the pumping rod. The shaft being all open and unprotected, it required a good deal of nerve to step across the yawning abyss below, but it was found so advantageous that eventually arrangements were made to carry all the men; and at Mansfeldt, in Prussian Germany, a plan was adopted by which the platforms nearly touched each other, so as to avoid this danger. In Cornwall the ascent and descent were made in a similar manner, but independently of the pumping rods, by what was called by the miners there the "man-engine." Most admirable machinery of this kind had been put up by M. Warucque at his colliery at Marienmont, where the step was large enough to accommodate two persons at once, and so well boxed in that all risk seemed to be removed. He spoke of risk, because there had been one or two sad accidents with the man-engine, arising out of persons going down by it, who not being accustomed to the noises of a pit lost their coolness and presence of mind, did not keep clear, and came in contact with the beams. In this country a great improvement had been made in this respect, and instead of two rods a single rod was put in, the steps being 2 fms. apart, and at corresponding intervals sollars were constructed, which the steps all but touched. In made about eight strokes in a minute, and 12 ft. at a stroke, so that the rate of ascent or descent was 72 ft. in a minute. The expense of this single-rod system was not considerable, and wherever a shaft was 150 fms. deep, or more, a man-engine should be put in. There was good reason for believing that this mode of conveying the miners up and down the shaft was in the end a great saving to the proprietors of the mine, to say nothing of the great boon it was to the men—getting rid not only of the inconvenience of climbing, but conferring upon the men many more years of health and usefulness than they formerly attained. Thus the man-engine was a great advantage to all persons concerned, and ought to be introduced in all cases where the shaft was 150 fms. deep, or more.

Lecture XXV.—In proceeding to consider their construction, Mr. Smyth said that levels and drifts were galleries, or road-ways, or air-ways, made in the "country," or in the lode itself, of different dimensions for different purposes. They might be conveniently divided into seven classes:—

1.—Those which were for *exploratory*, or merely temporary, purposes, and which were generally of small dimensions, although no regular rule could be laid down for them in that respect. In the older workings they were often so small that a man must go double to walk through them. Sometimes, when a couple of costeaning pits were put down, an exploratory level would be driven between them, so narrow that it could only be passed through by creeping, or crawling. As a rule, this system now-a-days was discarded. It had been found that, besides inconvenience to the men, the disadvantages of small levels far outweighed any saving in their construction, particularly as regarded ventilation. In Yorkshire, however, particularly in the Richmond mountain limestone district, there were yet in use what were called "dark drifts," and "hand levels," which were only 4 ft. in height and 2½ or 3 ft. in width, just giving room for a man to pass through in a constrained attitude, and, of course, with much fatigue and inconvenience, pushing before him a little wagon, called a "driving wagon."

2.—*Ventilating drifts* were also of a variable size. Occasionally they were made very small, and even smaller than the Yorkshire drifts, as being considered economical, although it was a poor economy to make drifts for the conveyance of air of too small a size. They were generally 2½ by 4 or 3 ft.; in stratified deposits it was more usual to have the ventilating drifts made of the same size as the principal working roads of the mine. In Staffordshire, for instance, where there were enormous seams of coal, 30 or 40 ft. in breadth, the ordinary travelling roads were 7 or 8 ft. in height. Where a separate opening was cut as the air-lead, there was danger if small dimensions were adhered to, when the top or sides were of a crumbling nature, that the ventilation would be rendered extremely feeble by falls of material, besides rendering it difficult of travelling through to clear away the obstructions.

3.—*Ordinary levels and roadways*—which in metalliferous mines often depend on the width of the lode. They used generally to be between 3 and 4 ft. high, and when visitors had the misfortune to be obliged to travel through the whole level they found it very painful to adapt themselves to such miserably small dimensions. They were, to be sure, shaped like a coffin, giving a little more room for a man's shoulders, and narrowed in at the feet, but when anyone was passing through the air could scarcely get by him. These were invariably the dimensions in the old mines, and could be traced back from the time of the Romans to the end of the last century. From that time an improvement began to set in, until at length they were made 5 or 6 ft. in height, and from 2½ to 4 ft. wide. During the last 30 years it had been sufficiently shown by the practice of all the better mines, both on the Continent and in this country, that it was best to have a clear height of 7 ft., and as large a width as from 4 to 5 ft. Even in those mines in Yorkshire, with such small airways, the main levels had a clear opening of this area; and if timber or stonework had to be put in, room should be left, so that there would be a height of 7 ft. and a width of 4 ft. In the Foxdale Mine, in the Isle of Man, where the lode was very variable, being sometimes large and sometimes almost invisible, and where very strong timbering had to be put in, the dimensions kept up were 7 by 5 ft.

4.—*Adits* for conveying water into the mines ought to be carried at a moderate downward inclination.

5.—*Drainage levels, or adits*, were very similar to the galleries described, but it was seldom necessary to resort to the larger dimensions he had spoken of. It was, however, of the greatest importance to the health and comfort of the miner that a good water channel should be established. Too frequently the drainage was allowed to run along the bottom of the roadway, and the men had to walk through it. The water very often was exceedingly cold, and the men who had to do this were much troubled with rheumatism. If the mine were one in which there was a large quantity of water it was necessary to make the adits 8 feet high, so as to have a floor and leave the men room to walk. It was sometimes necessary to make the adits of such proportions as to allow for the passage also of air currents. In the coal districts these adits were made so small as to be mere "soughs," but in metalliferons mines that could not always be done.

6.—*Adits* intended to unwater large districts, comprising many square miles, and to receive the waters of several mines, must be made 9 or 10 ft. in height, and of proportionate breadth.

7.—*Canals*, which were comparatively rare; but some enormous works of this nature were carried out at the end of the last century by the Duke of Bridgewater, on whose canal boats of large size brought the contents of the mines from the dark, deep bowels of the earth into the daylight.

In metalliferous mines the general shape of levels was rather higher than broad—say, from 6 or 7 ft. high to 3 or 4 ft. wide; while in collieries, and in works in stratified rocks, they were generally speaking rectangular, occasionally square, but often broader than high. The inclination of levels was an important subject, for, supposing they were driving a level for the ordinary purposes of exploring, it became a matter of great moment to know in what direction they were going, and that would depend much upon the judgment of the mine manager. In exploring an unknown country this was of still more importance. Then, again, the manager must see that the dimensions fixed upon were adhered to. The workmen were apt to get out of the direct line if they met with softer or easier ground in the midst of hard and difficult work, and so sometimes the level would imperceptibly increase in dimensions to a degree now and then which would add to the expense of the timbering requisite to secure the level, and also to the cost of removing the material dug out. Neither should the men be allowed to contract the size. Another caution in driving levels was to take care that the rise of the sole was not too great, for the miners were very apt in hard rock, and particularly in watery ground, to rise too rapidly, and the manager must from time to time step in to insist on the sole being cut down. This should be done frequently, as otherwise it might lead to great grumbling if there were much to be cut down. In fact, there was no work which repaid the labour and trouble of a close supervision while it was going on so much as in driving the levels of a mine.

Another point to secure was that they should be driven in as direct and straight a line as possible. Of course, driving levels through a dead country was expensive and tedious work, and a question was sometimes raised as to the possibility of getting rid of the tutwork altogether. Even in coal districts where they are driven in the bed, very little coal is obtained from them, and in metalliferous mines they did not expect to receive any ore worth speaking of. The enquiry was, however, a vain one, as no mine could prosper or have any degree of permanence without a sufficient proportion of exploratory work being carried on regularly and systematically. The great adits for unwatering large districts were a different sort of work altogether, and although no marketable mineral might be obtained in miles and miles of drift, the object sought was fully attained. Some of these works were really remarkable. The great county adit in Cornwall, for instance, was a work which, although it nowhere passed underground to any great distance, was about 40 miles in length, and draining the rich mining districts of Redruth and Gwennap to a depth of from 30 to 40 fathoms, carrying away a good amount of water which would otherwise go into the mines and have to be pumped out. The usefulness of these works depended much upon the geological nature of a district. For instance, in some limestone districts an adit drainage would be of no use, but in others it was just the reverse. In Derbyshire the shallow workings made no water whatever, but when the mines reached greater depths, the quantity of water that came in was so enormous that no amount of machinery would be able to keep it under, and in this case the driving of an adit level (or "sough" as it was called in that country) was the only way of dealing with the difficulty. These undertakings, when carried through a whole district, were effected by each mine proprietor agreeing to pay a proportionate share of the cost. In this country it was difficult to make arrangements of this kind, as there are always so many different interest to deal with, and men estimated their chances of profit so differently; and in old countries, such as Cornwall, many of the richer mines had reached to so great depths that adit drainage could not benefit them. In the North of England, however, a large proprietor, Mr. Beaumont, M.P., who was hampered by no difficulties of this kind, had carried out a drainage adit six miles in length, by which his deeper lead mines at the upper end of the Allendale Valley were unwatered. In the Clausthal district of the Hartz great works of this kind have succeeded one another, and been productive of untold advantage. A remarkable case was that in which a great distance was accomplished in a very short time by sinking shifts on the line, and then working right and left towards each other, so that ten different sets of men could be employed at once. This adit was 18 miles in length, and it laid dry the country to a depth of no less than 200 fathoms. They were now engaged upon a still deeper adit, the water from which would have to be pumped up to the shallower one, which had a natural out-fall. Another of these famous works was that called the Francis adit, at Schemnitz, in Hungary, so called after the Emperor Francis, where the shafts could not be put down so near to each other as those at Clausthal, but being carried under high mountains, the distance between the shifts was 1¾ mile. This, of course, greatly enhanced the difficulty of the work, and it was the selfsame difficulty which made the work of cutting a tunnel through Mont Cenis so formidable an undertaking. That tunnel would be between 7 and 8 miles long, and the extreme height of the mountain rendered the sinking of a ventilating shaft a simple impossibility. No expense was spared, the arrangements were of the best possible description, and no doubt could be entertained of a successful result; but in a mine adit the engineers had no such advantage, either as to means, or room, or appliances. The Francis adit, however, was admirably carried out, by driving parallel drifts between the Zopser shaft and the Sigilsberg shaft, a distance, as he had said, of 1¾ mile. The Oscar level for draining the Persberg district, in Sweden, was also a remarkable work. The opening was 8 ft. high and 9 ft. wide, driven through rock of the hardest quality. It was here that they employed the boring machine of M. Bergstrom (described in a former lecture), which operated by the extreme rapidity of blows given by a borer worked by means of compressed air. Another work of the same kind, and likely to prove greatly advantageous to the silver mines of Nevada, in California, was in the course of construction to unwater the Comstock lode. That adit was to be 4 miles in length, and, considering the richness of the lode, and the obvious benefit that would result, it was surprising that so much doubt should be expressed on the subject. It was another instance of the difficulty of obtaining the joint action for a common purpose of a set of men whose views, inclinations, and interests clashed. This enormous vein in Nevada was the property of so many different persons, and some of them with prospects of so uncertain a character, that it would be difficult to complete the work, unless the Government stepped in and undertook the responsibility apportioning to each interest benefitted a proper share of the cost.

Lecture XXVI.—The height at which levels were carried must be decided in all cases by actual observation on the ground as to the nature of the roof and floor. If the natural roof were a bad one, and apt to break away, it might be proper to cut away principally at the roof rather than the floor to obtain the requisite height for travelling, but it would often happen in the same level that different modes of treatment must be adopted to suit the varying circumstances or conditions met with. In metalliferous mines especially there might always be expected great variations as regarded the character of the vein itself, and of the country through which it ran. If the vein were one of small dimensions, and laid nearly perpendicular—say, 1 ft. in thickness—the level to be conveniently worked must be at least 2½ to 3 feet in width. If a lode inclined a good deal it would be found inconvenient to use the workings on it as a thoroughfare, and this was notably the case in the mines of St. Just, in Cornwall, where the veins frequently being small the level was carried single-handed, so as to leave room only for a wheelbarrow. Better means of carriage were, however, now introduced, and it became a question partly of comparative expense in the first breaking ground, and partly as to the nature of the rock on each side, whether the lode should be carried within the breadth of the level. When this plan was acted upon, one of those mixed bargains with the men, to which he had alluded in a former lecture, should be made, paying them so much per yard for advancing the level, and so much in the pound for the amount of ore they saved and sent up separately. Supposing a lode from 2 to 4 feet in breadth, it would, if the material were suitable, be always advisable to take out the whole, and perhaps a little of the walls from time to time. Many of the lodes in Cornwall, Devon, Cardiganshire, and in Saxony were of this kind, so that they always had the means of knowing what their lode was making; but if a lode were large, the question became a serious one as to the selection of the side or part in which the level should be driven. Supposing it was so wide that the whole could not be excavated at once, on account of the difficulty there would be in keeping up the roofs and sides, they would select that part which had the best appearance of richness, and explore the other parts by cross-cuts from time to time. If they found anything to warrant such a course, they would then take steps to remove the whole mass. If it were of a moist nature (which was generally the case when veins were unusually large), and it was thought desirable to keep the level open as a thoroughfare, proper timber would be found to be very expensive, and subject to be constantly broken. It would then become a question whether it was not advisable to drive the level outside the lode altogether, and place it in the country, from time to time putting in cross-cuts through the lode to the other side. This might prove to be the way most consistent with true economy, and the lode might then be worked in chambers, as in some stratified deposits. Sometimes it would be necessary to do this for entirely opposite reasons. In Cornwall the lodes were often so extremely hard that it was preferable to go from the lode into the granite. In the Phœnix Mine, in Cornwall, the lode was from 10 to 15 feet in thickness, producing sometimes copper and sometimes tin, and it had been found so much more expensive to drive in the lode than in the country that the levels were run outside the lode, which was worked from them. Again, supposing the country to be very strong, and the lode broken and disintegrated, it might be the only possible mode of working it to drive the level partly on the lode and partly out of it. In such a case the timbering must be carefully managed, so as to prevent the loose material of the lode from breaking into the level. The lecturer then, by means of drawings, explained a number of cases of this complex kind, varying according as the operations were upon the hanging wall or the footwall. It was such circumstances, so continually varying, and presenting such different conditions, that tested the judgment and tried the skill of the manager, not only as to the best means of meeting every difficulty, but of maintaining constantly a proper economy in expenditure. It might appear very easy to make up their minds to follow a lode, but nothing was more common for visitors to a mine than to find the men stating they had lost the lode; and it was on that very account that in all drawings of actual workings there were so many irregular drivings, where there was neither ore nor anything else worth the trouble. Lodes often dwindled away to mere strings, until it became a problem of great anxiety which of these strings represented the lode and should be followed, or whether cuttings should be made right and left to test them.

A careful manager, under such circumstances, would go back far enough to a place where the lode was well characterised, take accurately its proper course or strike, and then see whether the men deviated from the lode, or the lode from the men. Thus, he would frequently be able to discover the nature of the circumstance which cause the men to swerve from the lode and follow the ground, and he might at that point have to order the ground to be all broken over afresh, so as to enable a close inspection of the strings, and the direction they took. Perhaps he would have to put in a small cross-cut, and pursue the examination by that means. Very frequently these measures resulted in the lode being found again, and further on in as great richness as before, although now and then the reverse would happen. In other cases the men might carry the level quite right, and the lode itself would have really disappeared. In good mining the level would, notwithstanding, be persevered with, and everything in the way of joints or strings in the rocks most carefully examined, frequent cross-cuts also ought to be made, as there were many instances on record in which mines had remained poor for years, and all the time within, as it were, a hairbreadth there were great riches.

Mr. Smyth then, by means of diagrams, described the modes in which levels were protected from crush, the relative strength of the timber to be put in under different circumstances, and the precautions which had to be observed. He also described the different kinds of timber employed, giving the first place, for usefulness and a fair amount of durability, to pine wood and larch, and particularly to that which, although called Scotch fir, was the *Pinus Silvestris*, and grew on the shores of the Baltic. Of course, where oak could be obtained cheaply the branches were very useful in small workings, but in other respects it was much too dear to be generally used. Beech and birch were a good deal used in some countries, but they were more brittle than the *Coniferæ*. In the South of Europe and America, Spanish chesnut was much used with advantage, and in Italy the *Acacia*. The nature of the duty it was to perform, and ease and cheapness with which any particular kind could be obtained on the spot, no doubt regulated the selection to a great degree; but in Cornwall, and other places similarly situated, when it all had to be imported, relative considerations might be excluded, and absolute excellence arrived at.

Geological Society of London.—Jan. 22: Warington W. Smyth, M.A., F.R.S. (President), in the chair. James Trubshaw Johnson, mining and civil engineer, Lichfield, Staffordshire, and Stephen Brown Dixon, Jun., Pewsey, Wilts, were elected Fellows. The following communications were read:—

1.—"On the Specton Clay," by John W. Judd, F.G.S.

2.—"Notice of the Hessle Drift as it appeared in sections more than forty years since," by Prof. John Phillips, D.C.L., F.R.S., F.G.S.

On Wednesday, the following papers will be read:—1. "On the Geological Structure of Argyllshire," by His Grace the Duke of Argyll, F.G.S.—2. "Notes on the formation of the Parallel Roads of Glen Roy," by C. Babbage.—3. "On the origin of smooth, rounded, and hollowed surfaces of Limestone and Granite," by D. Mackintosh, F.G.S.—4. "On the Encroachment of the Sea in the Bristol Channel," by D. Mackintosh, F.G.S.—5. "On a striking instance of apparent oblique lamination in Granite," by D. Mackintosh, F.G.S.

Manchester Geological Society.—The monthly meeting of members was held on Tuesday, at the Museum, Peter street; Mr. Greenwell in the chair.—Mr. J. Plant, the curator of the Peel Park Museum, read a paper on the glacial groovings on the bunter sandstone at Ordsal Clough, Salford, the discovery of which was mentioned at a meeting of the society last summer. He said the glacial groovings were upon the surface of the pebble beds which became exposed by the removal of a deposit of great depth of boulder till in the course of forming an extension of Oldfield Road across the fields known as Oldfield Clough. More than ordinary attention was attached to the discovery from the fact of its being quite unique, there not appearing, so far as his knowledge extended, any preceding record of the marks of glacial action on the rocks in the locality of Manchester. The height above the sea level of the exposed surface of the new

redsandstone was 96 ft. at Ordsal Clough. His attention was called to the pla c by the road contractor, who described the groovings as "a layer of stone pipes in the red rock," which he had never experienced before. On visiting the spot the true nature of "the stone pipes" was readily suggested by their resemblance to the glacial groovings he had seen in North Wales. They were prominent enough to be felt by walking over them, they being covered with water. As it was necessary to break up the road in a few days, and as all glacial action would be then destroyed, he thought it desirable to save some of the finest groovings, and that was affected after much labour and trouble. The depth of the grooves was about 3 in. and width 5 in. The prominent ridges were well rounded, and of equal proportions. The direction of the groovings was coincident with the direction of the strie observed by Mr. Morton near Liverpool. The paper was illustrated by several drawings, including one which showed the glacial groovings over a space of 14 ft. Mr. Plant stated that a mass of about 5 tons of the sandstone, showing some of the prominent ridges and grooves, is now in the Museum at Peel Park.—Mr. Aitken said he had visited the place, and could bear testimony to the accurate record prepared by Mr. Plant. The marks were very distinct and unmistakable.—The Chairman said that a plain straightforward statement of actual facts (such as had been read) was worth a great deal more than theory.—Mr. Binney said the chairman should say it was worth more than hypothesis. The Liverpool groovings were much sharper than those at Ordsal Clough. All the glacial markings on the south side of the Isle of Man were in the same direction. He believed that many similar markings would be found in the neighbourhood of Manchester.—Mr. Plant also drew the attention of the members of the society to a candle which was found in 1863 in a Flintshire coal mine when the mine was drained. It had been under water for 80 years; the tallow had been converted into a hard soap, and was coated with iron; the wick was of flax. The candle would light readily, and he had no doubt that it would readily consume.

MANCHESTER GEOLOGICAL SOCIETY.—The two first parts of the new volume of the "Transactions" of this society have just been issued. The annual inaugural address by the President (Mr. E. W. Binney, F.R.S.) is highly interesting, and there are the reports of the council, curators, and treasurer. The second part contains a very valuable address by Mr. G. C. Greenwell, upon taking his seat as President of the society for the ensuing two years; notes on the society's excursion to Clitheroe and Pendle Hill, by Mr. John Aitken; and on some instances of the superficial curvature of inclined strata near Blackburn by Mr. James Eccles. The latter paper is accompanied by four sheets of drawings.

ASSOCIATION OF MINE AGENTS OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

[Papers read at the annual meeting of the Association, at Dudley, on Jan. 20.]

EXTENSION OF THE SOUTH STAFFORDSHIRE COAL FIELD.

REVIEW OF THE DIFFERENT TRIAL SINKINGS AND EXPLORATIONS IN VARIOUS PARTS OF THE SOUTH STAFFORDSHIRE COAL FIELD DURING THE LAST TWO YEARS.

By Mr. HENRY JOHNSON.

To do the subject which I am about to address you upon full justice would require very much more time than has been allotted me on this occasion. All that I can now do must necessarily be a hurried outline only, reserving for a future meeting that minute detail which is so essential in forming correct geological deductions as to a new and an unexplored country. The extension of the South Staffordshire coal field is a subject which has very seriously occupied the minds, and also I may say the pockets too, of many persons for the last two or three years, with, I regret to say, at least so far as the explorations on the southern margin of the coal field is concerned, anything but successful results. These disappointments are the more to be deplored, coming as they do at a time when good maiden thick coal is so much needed and so much sought after by capitalists, and in the face, too, of such golden hopes held out by eminent geologists and others that total failure was impossible. These remarks are referable to the trial sinkings at Wassel Grove, near Hagley, and the Manor Farm, near Hales Owen, being about 2¾ miles apart, and each of them lying about a mile over the known productive portion of the coal field.

At Wassel Grove a trial shaft has been sunk to a depth of 262½ yards without discovering anything worth working either in the shape of coal or ironstone. At 165 yards from the surface a headway was driven north for 500 yards towards the known coal field in some thin layers of coal and bats, trial holes were sumped up and down in such headway without avail, and all further exploration in a fine estate of 600 acres is now abandoned, and the plant and machinery being removed. There can be no doubt that the shaft passed through the true coal measures of the South Staffordshire coal field, but in an attenuated and debased form, and also that the bottom of the shaft reached the Upper Ludlow Rocks, containing numerous fossils characteristic of that formation. Before finally closing the colliery, however, it was carefully inspected by Profs. Ramsay, Bete Jukes, Salter, and others, all of whom were unanimous that the sinking had gone below all coal measures. I understand 12,000*l.* to 13,000*l.* have been expended in this unprofitable search, to the great loss and disappointment of the tenant, the landlord, and other local landowners.

The Manor Farm trial sinking has been prosecuted by its unfortunate but enterprising owner, Mr. John S. Dawes, to a depth of 428 yards, at a cost of some 12,000*l.* or 13,000*l.*, with pretty much the same result as at Wassel Grove. A bed of coal has, however, been discovered, from 3 to 4 ft. thick, at 310 yards from the surface, which is no doubt a portion of the thick coal. Trial headways have been driven in this coal north and south for 300 or 400 yards, without, however, discovering any increase in its thickness, and further search is for the present suspended. The noble and enterprising spirit which induced Mr. John S. Dawes to sally forth from comparative retirement and private life, and devote his energy and capital in such a great undertaking, deserved almost a gold mine in return. He also deserved far greater sympathy and (at one time promised) assistance from the local landowners. I suppose if he had been successful in discovering the Ten-Yard coal he would have had a monument subscribed for and erected to his memory in the market place of Hales Owen as big as the Eddystone Lighthouse. But, failing to find the coal, he scarcely gets sympathy where he ought to get assistance towards his loss. There is, however, one chance open for him to redeem his lost venture, and that is in Lord Lyttleton, his landlord, giving him a sort of roving commission to find coal where he can in his lordship's property, in the direction of the productive portion of the coal field. This would favour the idea that he may yet have a chance of recouping himself his large outlay, for I understand Mr. W. H. Dawes (his brother) is now driving a gait-road in the thick coal from his "tump," or Black Heath Colliery, towards Manor Farm, and that it is now driven in 1500 yards, the coal being good and its proper thickness, and looks likely to continue so. So that by continuing this road on, by consent, thick coal may yet be discovered within his lordship's bounds, which, if added to Mr. J. S. Dawes's lease, may enable him to redeem what he has at present in all human probability lost for ever. The gait-road from the "tump" pits, before referred to, proving as it does 200 or 300 acres of coal, is of great importance to that immediate district, and, no doubt, pleasing to its owner. The failure, however, of Wassel Grove and Manor Farm, as far even as can be at present judged, is a great loss to this district, as not less than 4000 acres of thick coal was pretty confidently calculated upon by men of great eminence in geology.

The shallow depth of the Upper Ludlow Rocks, at Wassel Grove, and the almost total thinning out of the productive coals and ironstones of the other part of the coal field in that direction, are circumstances which Professors Ramsay and Jukes, from their previous examinations of the district, were totally unprepared for, and it is a subject full of interest for scientific investigation. Some time ago, in order to relieve myself of the onus of recommending the total abandonment of any further search at Wassel Grove, I sought the advice and confirmation of my views from Prof. Jukes, so well known for his geological knowledge of this district, and, perhaps, this will not be an unreasonable time for me to place, for the first time, his views upon record, and so relieve myself of any charge hereafter of having acted incautiously in recommending its abandonment. Prof. Jukes says—"Having met you at Wassel Grove yesterday, for the second time, and examined with yourself and Mr. Hopkins the plans and sections of the pit lately sunk there, and of the 'heading' which has now been driven for 500 yards in the direction of the productive part of the coal field, and having compared our mutual knowledge of the geological structure of the adjacent district, and discussed all the known facts, and all the arguments that could be founded on them for or against the continuance of the mining operations at Wassel Grove, I have reluctantly come to the conclusion that you would do rightly to advise their abandonment. As a geologist, I should be glad to hear of further explorations being made, but I cannot honestly say that I think they would be likely to lead to a remunerative result."

From the south end of the coal field we then pass to the boring, sinking, and exploring at Wigmore, near West Bromwich, by Lord Dartmouth, under the direction of Mr. Samuel Bailey, of Walsall, but as there is much yet to do to complete it, I prefer leaving that for a future paper, to be read by Mr. Bailey, who will be able to do it far greater justice than I should be capable of.

I next come to the new sinking of the Cannock and Rugeley Colliery Company, near Beaudesert, nearly at the extreme north end of the South Staffordshire coal field, where a princely plant has been put down, and the fine beds of coal discovered are very fit adjuncts thereto. There are a pair of pits 12 ft. in diameter sunk 200 yards deep, to what is called the "deep coal," and which averages about 7 ft. 3 in. thick, and the "shallow coal," about 20 yards above the last seam, is about 9 ft. 3 in. thick, both very good coals, combining hard steam and free burning house coal, and the extent proved by these pits may be taken at 2000 acres. Besides the seams referred to there are several workable beds above. This colliery has been opened out by a limited liability company, at a cost of above 80,000*l.*, commenced under the able direction of Mr. Bean, of Butterley, and finally by Mr. W. W. Kenrick, of Ruabon, North Wales; and the members who visited this colliery in September last will no doubt retain for a very long time a profitable and pleasing recollection of the admirable manner in which all the working details of this large colliery have been carried out under Mr. Kenrick's direction. This colliery, together with Mr. McLean's increased means of production at Cannock Chase Colliery, Messrs. Holcroft, Fellows, and Co., at the Cundult, and Messrs. Harrison, of Brownhills, four collieries, are now raising about 35,000 tons of coal per week.

So much, then, for a rapid glance at some of the attempts to increase the production of the coal field, but a great deal more might be said of the rapid exhaustion of the known portion of the coal field. Some other member will, however, perhaps favour us with his views upon the exhaustion at a future meeting, for it is a subject, I must confess, I do not like to think of, much less to dwell upon. There is, however, one thing certain to my mind—that new discovery and development is not by any means keeping pace with the consumption. The Mining Commission, now sitting, will doubtless give us a fund of information upon this subject when their labours are completed, and I have no doubt will go far to convince us of the old adage that "those who live longest will have to fetch coal farthest." In conclusion, I would just observe that I think the Thick coal, no doubt much of it "black," will ultimately be found under nearly the whole of the Rowley Hills. The adjacent successful winnings of the Earl of Dudley, Messrs. Taylor, Davies, and Co., Mr. Richard Haines, and Messrs. North, Wright, and North, are strong evidences of this.

Hoping before our next annual meeting there will be a brighter and more silvery cloud visible over the Black Country than there is at the present time, and that both masters and workmen will be able to congratulate each other (and ourselves too) not only upon the discovery of new mines but at our deliverance from about as wretched a state of commercial existence as it has ever been my lot to know in old South Staffordshire.

RESULTS OF A TRIAL HEADING,

DRIVEN INTO THE GREAT WESTERN BOUNDARY FAULT, FROM THE EARL OF DUDLEY'S NO. 3 PIT, AT HIMLEY COLLIERY.

By Mr. WILLIAM SPRUCE.

The trial heading which I am about to describe is one of considerable interest, as bearing upon the probable extension of the South Staffordshire coal field in a westerly direction. The pit, from which this exploration was conducted, is about 90 or 100 yards from the great fault before referred to, the upper part of the shaft having been sunk about 60 yards from the edge of the Permian measures at the surface, and is about 130 yards deep to the thick coal, the coal dipping about 1 in 4 easterly from the shafts. The gait-road, which is driven into the fault, is at right angles with it, and is driven in the floor of the thick coal. The end of the thick coal and other measures abutting against the Permian fault have a most unusual appearance, being exactly contrary to the general rule. For a most minute illustration of this peculiarity, I must refer you to the very carefully prepared section before you, which has been made at a great cost of time and trouble by Mr. John Hughes, his lordship's surveyor, during the different stages of the explorations made by myself.

On looking at the section you will perceive that for about the first 50 yards of the gait-road leading to the great fault the thick coal is pretty much in its entirety, but is cut up by a great number of downfalls, dipping towards the main fault. But for the remaining 30 yards nearest the fault it loses all its regular bedding, is very soft, mushy, twisted and much contorted in all forms, and the end of it rises in a feather edge very abruptly against the Permian measures, instead of dipping, as it does in most cases, along the run of the same fault. The heathen coal rises nearly upright, with a similar feather edge, against the Permian measures. The heading driven into the Permian rocks shows that they dip away from the coal field at an angle of about 60°, which is, to my mind, an indication that if the coal is to be found on the downfall side of the fault it will be at a great depth.

Fortunately, we were not troubled with any water in the head-way driven into the red measures, but at the back of it there were indications of some. In other explorations along the run of the same fault to the south, I believe great quantities of water have been tapped in similar searches, which have proved very troublesome and disastrous. At a point about 700 yards north of this proof of the main red fault, I have driven again in the direction of it from the same pit to where the same fault is marked on the Ordnance Geological Survey, but instead of finding the red rock facing the thick coal at that point we found white coal measure rocks, which shows to me that there is probably an angle of coal beyond where the main fault is shown on the Ordnance map, and may possibly lead to the existence of an additional tract of thick coal under the Himley district, beyond what we have been hitherto led to believe. At several points along this main fault, where it has been explored south of the one referred to, the thick coal has dipped considerably under the red rock fault; but at the Earl of Dudley's Park Hall Colliery, near Wolverhampton, several miles north of Himley, the nearest proof in this direction, there the coal rises very abruptly against the main downfall fault, and assumes the shape of the letter S, and was called the "turnover" by the colliers when working against it, and not a fault, as is usually the case, the coal being so upright in some places that I have known a shaft sunk more than 20 yards in it on the end of the coal without passing out of it, showing some similarity between the measures at Park Hall and those at Himley. After the explorations were completed, Prof. J. Bete Jukes had the opportunity of inspecting it, and expressed great pleasure in his visit. He, however, was astonished at the very singular termination of the thick coal against the red rock fault. As it is contemplated to lithograph the most interesting portion of the section, I trust the members of this association by furnishing themselves with a copy may be better enabled to study it in detail; and as the extension of the South Staffordshire coal field is now forming a very interesting topic, I trust other members will favour the association with full particulars of similar explorations, by which there can be no doubt great good will result.

SHAFT ACCIDENTS, AND HOW TO PREVENT THEM.

By Mr. WM. BLAKEMORE, New Cross, Wolverhampton.

The duties of a colliery manager or mine agent may be resolved into two. First to work and win all mines under his management so as to realise the greatest amount of interest for the capital invested. Secondly, to do this with the least possible risk to the safety of those individuals whose lives are devoted to this perilous calling. All his plans and appliances, all his energy of thought and action, are supposed to aim at these results; but you know, gentlemen, how often he is disappointed in the object of his pursuit, sometimes on account of physical difficulties, such as the bad quality and very faulty and disturbed condition of the mines, especially in South Staffordshire, the irregularity of the strata, and the swampy and undulating character of the floor of the mine, the great quantity of water to be got rid of, and the presence of noxious gases to be neutralised and rendered harmless.

Social difficulties are the adverse influences of ill-advised, misguided unionists.

Metaphysical difficulties are the obstinacy, caprice, and unreasonableness of subordinates, which is generally the result of ignorance.

Civil difficulties are the offensive and sometimes expensive, and not frequently mistaken, interference of the Legislature of this country relative to mining operations; and although the mine agent may summon to his aid all the help of practical and scientific mining skill, and exercise the most untiring diligence and economy, he often has the dissatisfaction of knowing that at the stock-taking term a balance is placed on the losing side of the ledger, and that both principal and interest are in danger of being lost; and as the colliery manager or mine agent often fails to produce profitable and material results, even so does he likewise fail to secure for the miners a perfect immunity from either slight or fatal accidents. Accidents do and will occur notwithstanding the existence of the strictest system of discipline, the most judicious oversight, and the application of all the modern improvements of mining science in connection with the advantages of a long and large experience; and as the mine agent is looked upon as the person who is responsible for the safety and protection of the workmen, and knowing that every accident which occurs is not only a loss to the injured person, but obstructs the working of the mine, and invariably imposes a heavy tax upon the owner, and sometimes on the agent. It, therefore, behoves him to spare no pains or reasonable expense in promoting what he conceives to be the best, and most efficient means of preventing accidents, and making his own weighty responsibilities bearable. I think every mine agent should bestir himself, and bring all the mechanical ingenuity and engineering skill that he possesses to bear on this very important part of his duty, for it is to be feared that when we have made the most reasonable allowance for the average run of accidents, the imperfections of human agency, and the defects of human plans, that much more might have been done in South Staffordshire to accomplish this object than has been done. I am not going to fall in love with that odium which some prejudiced persons have sought to heap upon the mining officialism of this district, or to endorse the sentiments of those wiseacres and jaundiced-eyed individuals who look from a false stand-point, and say here is "antiquated experience," here is "reckless management and gross negligence!" but it is to be deplored that her Majesty's Inspector of Mines should have to return in his annual statistics such a large number of fatal accidents occurring in and about the coal and ironstone mines of this district. I need not enumerate the various causes of accidents in mines—you are too well acquainted with them from daily and personal observation to require a recital from me. But there is one prolific source of accident which I have ventured to bring before your notice to-day, and which I think has a claim to your serious consideration—shaft accidents, which are brought about by things falling down the pit, ropes and chains breaking, persons tumbling off the cage, &c., skips, runners, overwinding, and falls from the surface. I have observed with great regret for many years the important position which this class of causalty occupies in the Inspector's annual report to her Majesty's Secretary of State. The number of fatal accidents from this source alone formerly ranged from 40 to 50 annually; but I am sure every mine agent will be pleased to know that now the list is reduced to one-half, and I am of opinion that it is still capable of a further diminution. I hope and believe the time is not far distant when the yearly number of fatal accidents in shafts will be returned as 12 instead of 25. To bring about this very desirable result several things are indispensably necessary. There should be perpendicular shafts of not less than 7 ft. diameter, and greater whenever practicable, and securely lined with good hard bricks and mortar. Good ropes and chains made of the best material, the size and strength of which should be determined by the amount of work to be done. It was only a few weeks ago that I heard a mine agent of high standing say that during the last year he had a very narrow escape of his life twice. It appears he had been down one of the pits under his inspection, and almost as soon as he came to the surface and placed his feet on "terra firma" the rope broke and dropped the skip, while he stood stiffened with surprise at his merciful deliverance. This shows the importance of having good ropes and chains; good tacklers, skips and bonnets, or cages where used, safely fenced and something to hold on by, with movable wickets at the pit top. Pit frames and pulleys of sufficient height, and properly fixed. Good winding apparatus and an adequate break, an engine always above its work, a careful, sober, and efficient engine-driver (if you can get him). Proper means of communication from bottom of the pit to the engineman—the banksman, with a watchful and untiring supervision. I might mention a thousand and one things which contribute to the prevention of shaft accidents, but have only selected a few which I thought were necessary in this district; those who use conductors may be reminded of Owen's patent safety-cage, and also McGill and Walker's disengaging-hook. And last, though not least, the application of the permanent travelling fence, which is so well adapted to the open shafts of this district, a model of which I have brought here to-day for your inspection, and, therefore, need not attempt any description of its construction. The contrivance is simple and inexpensive, and can be modified to suit most persons and places, and the cost of making and fixing need not exceed 3*l.*; it may be said that this fence increases the weight of the wagon and makes it run harder. In reply, I may be permitted to say that I have it applied at all my working pits with the exception of those using conductors, and I have only met with this objection in two instances. When it was first put to work it was looked upon as an innovation, and one of the butties stoutly declared that "he'd never a' that thing at his pit, for it ud take anotha mon to push the wagon up." I reasoned the matter over with him, and pointed out its advantages, and then he consented to try it. He did so, and afterwards told me that "it was one of the best things he'd ever seed in his life, and he would na be without it for no money." It may, however, be said that it fences off the back of the pit and impedes a quick landing. This is the strongest objection that can be raised against its adoption. I beg to say, in reply to this reasonable objection, that I have two bottom coal and two fire-clay coal pits on one engine, and we raise from 18 to 20 skips per hour; and at another bottom coal pit we are raising upwards of 100 tons of coal per day, without the least inconvenience from the permanent travelling fence. I never get a complaint against it now, and wherever it is adopted both the butty and the banksman approve of it.

In conclusion, allow me to remind you that about one-fourth of the shaft accidents occur through persons falling from the surface while engaged at their work. We all know what great danger there is at the top of an unfenced pit in dark, wet, and windy weather. We wonder not this list of fatalities is so great, but that it is so small. With this fence you prevent both skips, horses, men, women, and children from falling into the pit, unless there is a fixed determination to commit suicide. Gentlemen, if we can by the adoption of this or any other simple fence save a fourth of the lives that are annually lost in shafts in this district is it not our bounded duty to do so?

For the sake of society, for the sake of human life, which is the most sacred and precious of all things, for the sake of our owners' interest, and for the sake of our own peace of mind, let me urge upon your most serious consideration the necessity and the means of preventing shaft accidents, and especially those which occur through persons falling from the surface.

MODERN MINING.

By Mr. W. W. KENRICK, Viewer, Ruabon and Walsall.

At this the first annual meeting of the Incorporated Association of Mine Agents for South Staffordshire and East Worcestershire, I have the pleasure of bringing before you a short paper, with the rather too comprehensive title of "Modern Mining," and I trust you will kindly excuse its short comings and imperfection, as my time lately has been too much occupied to allow me to give to its preparation that care and consideration which the subject so richly deserves.

As it is obviously impossible in the short space of time allotted to me to go much into matters of detail, I propose to look at the subject rather as a question of profit and loss—that is, mining considered as an investment of capital, and to treat the several divisions of my subject in their economical and commercial aspect, rather than scientifically and technically. I venture to say that you will agree with me in considering this view as most important, inasmuch as the sole object of all mining is profit, for a large colliery, with all its scientific appliances, its wonders of mechanical skill, its triumphs of knowledge and perseverance over the powers of nature, and its thousands of buried capital, must eventually be brought to the very same test which applies to the business of the smallest tradesman—namely, "Does it pay."

Mining is not merely a scientific profession, but, as I have already said, a question of profit and loss, and although it is quite true that the two should go hand in hand, it is equally true that the latter must never be lost sight of. A liberal economy should be adopted in every department, shafts of sufficient size, engines of sufficient power whether for pumping or winding, ventilating apparatus of sufficient capacity, and more than all, no reasonable expense must be spared in ensuring the safety of human life. All this being so obviously true, it requires great discrimination and judgement on the part of the engineer not to overstep the limits of profitable outlay. Up to a certain point a liberal expenditure is the truest economy, but beyond that it becomes a mere waste of capital.

It is evident to all that one of the first conditions of success is this, that there shall be a sufficient acreage of mine to get to allow of the recouping of the capital which must be expended, great mistakes being sometimes made by the laying down costly machinery and the sinking of large shafts for the working of a small extent of ground, and thus necessitating a too heavy charge upon the after-get of coal. With the present severe competition in the trade no effort must be spared to reduce the cost per ton to a minimum. It is, of course, impossible to lay down any rule which shall determine what acreage is sufficient for the recovery of capital, but what I wish clearly to point out to you is that, at the present day, a colliery possessing an extended take of ground is in a much better position to return a profit than one, in all other respects under equally favourable circumstances, working a coal field with a more limited area, and this may be attributed to the causes I have just enumerated. Allied to this part of my subject is the question of royalties, and in this matter it is my confirmed opinion that the progress of mining in this country is now being hindered by the high rate of royalties required by the lessors of mineral property, and I am quite convinced that it would be greatly to the gain of all parties if a lower rent were charged; and as a counterbalance for the benefit of the landlord much more stringent clauses might be introduced with advantage into leases, requiring the whole of the coal and slack to be cleared out, and compelling lessees to work the mine in a more systematic and economical manner.

Another matter intimately connected with the economy of mining and in which I think there is much room for improvement, is the mining of various properties bounding on each other; all of us know from experience how inconveniently and expensively coal has sometimes to be worked, owing to the obstinate cupidity of the owners of adjoining property. There is surely need for an alteration in the law, which shall, by making some arrangement between parties obligatory, promote the economical working of our coal fields, and thus conduce directly to both individual and national wealth.

Next in importance to profitable mining is the selection of proper mining engineers, for the scarcer our coal becomes the more will be felt the want of qualified coal viewers. I am of opinion that the profession of the mining engineer is *the most difficult* and responsible of the whole department of engineering, for in no other branch is there required such a combination of skill, perseverance, judgment, and personal courage; and, therefore, it is all the more necessary that we give our most serious attention to the subject of mining education. We are daily witnessing the failure of concerns which should by all reasonable calculations have proved successful: thousands of pounds are actually thrown away through inefficient mining.

Deficient ventilation, bad underground roads for conveyance of coal, improper methods of supporting the roof, and opening out the workings, the most injudicious division of labour, together with the want of order and system, may be met with at the present time to an astonishing extent in some mining districts of this country, to which causes are attributed in a great measure the accidents which are so frequently occurring, and the failure in a commercial point of view of the most promising concerns. It is the opinion of one of the most eminent mining engineers that "the speediest and most effective remedy we can suggest is that all responsible managers of mines be required by Government to obtain certificates of practical and theoretical competency for their situations before being allowed to enter upon them. Local boards of examiners could easily be established for this purpose; and it would be no difficult task to so combine the practical in examinations with the educational and scholastic as to preclude the possibility of any mere theorist obtaining a certificate, as in many instances through a mistaken notion of economy by proprietors, men are employed as responsible managers who are totally ignorant of the most elementary principles of mechanics, the laws of gas, the principle of the safety-lamp, the geometry of figures formed by faults and heaves, and the theory and accurate practice of surveying and levelling." To what source, therefore, are we *mainly* to look for such improvement as shall make mining a safe and profitable investment. To this I reply, the mining engineer himself, to whom it is just as important that mining should be a good investment, as it is to the capitalist whose money furnishes the needful appliances.

I have now to apologise for what I fear has been a very imperfect paper. The main idea which I have been trying to bringing out is this, that we as mining engineers must look to the commercial success of every undertaking in which we are engaged as the most important point of all. In conclusion, I must express my sincere hope and conviction that this society, of which we are now celebrating the first anniversary, will in course of time take its proper place among the great mining institutions of the country, and will eventually become in science and intelligence a friendly rival of the world-renowned North of England Institute of Mining Engineers.

THE MINERAL RESOURCES OF TURKEY.

Kharput is one of the very few provinces in Turkey where any advantage is taken of the universal mineral wealth existing throughout its extended limits. The silver mine at Keeban Maaden, however, only yields 400 okes (1125 lbs.), value 4363*l.*, which, after deducting half for expenses, leaves only 2000*l.* to Government. The galleries and shafts are now choked with water and rubbish, no serious attempts being made to utilise them, the feeble efforts practised under the lazy supervision of the superintendent, a German, being totally inadequate and useless. The Greeks, formerly connected with the establishment, state that, in addition to the silver, a large amount of quicksilver could be procured there, but that the imperfect means at their command occasioned its entire loss; they also state that in every batch of ore producing 100 okes (or 281 lbs.) of silver there was a mixture of from 50 to 300 drams of gold (320 to 1920 English grains). In Mr. Brant's time (1836) the mines produced only 200 okes of silver, value 2000*l.*; the workmen and miners (300 to 400) receiving 3d. and 2¾ lbs. of bread daily at ¼d., a quarter of its usual price. But, at the same time, the Government compelled the natives of the surrounding districts to supply a certain quantity of wheat, wood, and charcoal gratis, at an estimated loss to them of 10,000*l.* This statement was supplied him by the Seraf, who seems to have greatly exaggerated real facts. The number of men employed would only cost—less the price of bread—137*l.* 10s. per month, or 1650*l.* per annum, while wood and charcoal could hardly amount, if paid for at rates considered high there now, to 3000*l.* per annum.

At present, all the silver raised is the property of speculators, from whom the Government purchases it at 600 piastres (5*l.* 9s. 1d.) per oke (2 lbs. 13 ozs.), it being worth double that price, out of which they have to pay 400 piastres (3*l.* 12s. 8¾d.) expenses: thus leaving them 1*l.* 16s. 4¼d. remuneration. The great complaint, as at Arghana Maaden, seems to be the want of fuel for the furnaces; but were the Turks to bestir themselves they could procure an inexhaustible supply close to. The Deyrsim country is hardly twenty hours off, possessing a fine stream, the Mezoor falling into the Murad, navigable at all seasons of the year by rafts, and even fit for small boats, running from its sources through the whole of that country, abounding in immense forests of oak, fir, and beech. This maze of timber lines its immediate banks, and clothes the steep mountains, rising to the height of many thousand feet on either side. No use is or ever has been made of it, or the natural vegetable productions it contains. The Government has an excuse for ignoring such a close supply of an article they now procure from three times the distance by the Kara Su, from Kamach and Gerjannes, the want of which has compelled them to abandon a lucrative revenue, for the Deyrsim, through hemmed in by the garrisons at Erzingau, Khozat, and Mamakhatoon, is unsubdued, and will probably long continue, as now, as inaccessible to traders as its rebellious tribes are useless and dangerous to the State.

COPPER MINE AT ARGHANA MAADEN.—The copper mine at Arghana Maaden, nearly equidistant between Diarbekr and Kharput, situated on the extreme western branch of the Tigris, having its sources near the Göljik Lake, eight hours off, produced, in 1836 (Brant), 140,000 batmans, or 1050 tons, of imperfectly cleaned copper yearly. Now, as then, there seems to be no limit to the production, were fuel more abundant, and proper machinery employed; but the one is wanting, and from the absence of the latter the most productive shafts are valueless. Nor can fresh works at present be undertaken in their vicinity, from the danger arising from the water in the immediate neighbourhood. At the time I first allude to, the miners were obliged to raise and roast the ore at their expense, selling it afterwards to the Government for 7½ piastres (1s. 6d.) the batman of 16½ lbs., although, according to their assertion, it cost them 2s.; but as they were not allowed to leave, they only went through the semblance of work, producing, of course, as little as they conveniently could. At present, as formerly, there are a few masters employing gangs of men under them at a daily pay averaging from 3 to 5 piastres (6½d. to 10¾d.) Among them they raise 150,000 batmans (1130 tons) of moderately clean copper every year. For every maund (16 lbs. 13 ozs.) Government pays them 15½ piastres (2s. 8¾d.), more than double the price in 1836; but at the same time the cost of raising it amounts to 13½ piastres (2s. 5¼d.), against 2s. only 30 years ago, charcoal costing ¾d. per batman. In addition to the money price, Government gives 3 okes (8 lbs. 3 ozs.) of wheat for every maund of copper delivered at their works in the town, where the ore is first smelted, and then sent, at a cost of 8 piastres (1s. 5¼d.) per maund, to Tocat, where it is worth 40 piastres (7s. 3¼d.) before the refining process that takes place there. The means of roasting and smelting at the mine are so incomplete, that after the refuse has been rejected it is cleared away by outsiders, who again subject it to a process, leaving them ample returns. At present there are six productive shafts, sixty being closed from want of proper encouragement. In one of the latter ore was found containing a small proportion of gold, in the ratio of 10 drachms, or 640 grs., to 100 okes (281 lbs.) of copper. It is calculated that three men can raise 1000 maunds, or 7½ tons, of copper every year, at a cost of 13½ piastres (2s. 5¼d.) the maund of 16¾ lbs. to the master miner. The ac-

ant taken between him and the Government, or rather his nett profits, would and thus :—

00 okes of wheat (on 1000 maunds of copper delivered), equal 55½ keyls of Kharput, at 50 piastres per keyl=2775 piastres	£	25	3	7½		
overnment price of 1000 maunds of copper		136	7	3¼ = £161	10	10¾
ess expenses, at 13½ piastres per maund				122	14	6½
Nett profit to master				£ 38	16	4¼

Under these circumstances the master miner would be very well off; but the ergoo or poll-tax assessment of people engaged in this occupation is rated as igh as 1500 piastres (13*l.* 10*s.* 2d.) per annum, while the poorest pays no less han 300 piastres (2*l.* 14*s.* 6½d.), payments totally beyond their means. Based n the original imperfect census, such assessments may at some remote period ave been fair; but, in the meantime, this class has dwindled down in Maaden rom several hundred families to a very few only, who still bear the original urden, thus paying for the dead and absent. The actual gain to Government n every 1000 maunds at Tocat is—

000 maunds of copper at Tocat				£363	10	0
alue of wheat and price paid to miners	£161	10	10¾			
amel hire to Tocat on 1000 maunds	72	14	6½			
roportional share of expenses for Government staff, buildings, &c., at Maaden, costing 15,000 piastres, or 136*l.* 7*s.* 3d. per month	0	1	9½ =	234	7	3
Government profit				£129	2	9

fore than three times the gain accruing to the miner; but were the works open o all comers, and a royalty simply taken, instead of six shafts sixty would be orked, and the revenue on their produce would insure threefold returns to the reasury, when compared with the species of monopoly now existing. Forty ears ago copper from this mine was largely exported to India; it is now actually ported from Europe. The Government income annually derived at present om this source is about 19,000*l.*

After thus reporting upon the mines worked in the pashalik of Kharput, Mr. onsul Taylor mentions similar mineral deposits in the eyalet of Diarbekr that, though equally rich, seem, as they are uncared for, quite unknown. In the Kalkyt Kuzna, near Teyrsoom, is an extensive lead deposit, from which the Greeks about easily extract the lead they require. It is situated in an isolated hill, chickly wooded, forming the end of a short spur from the Glaour Dagh. A simlar deposit exists near Kamach, from whence the lead used in the Government military esthblishment at Erzingan is procured. The ore is very pure, and seems argentiferous. Near Eggil, eight hours from Arghana Maaden, at a place called Hosheen, is an old copper mine, lately ceded to a native Greek; and near it, at Demir Kapoo (Iron Gate), are two others, of lead and iron. A very serviceable lignite coal is procured near Erzeroom; and seams of bituminous coal are frequent near Tchermook, not far from Suerek, 18 hours from Diarbekr. Good coal crops out of the steep sides of the Merjan Boghaz, leading from Erzingan to the Deyrsim; and at a village in the Karoo Tchai district of the former; as also at Herbole and Shurnukh, in the Hajji Behram district, eight hours from Jezireh, in the Mardin Sanjak, a Kaimakamlik of the Diarbekr Government. In Shirwan and Berwaree districts of Saert (Diarbekr) are rich tin mines, and an unlimited supply of pure rock salt, in large slabs like crystal. The same deposit is found in equally large quantities at Norsheen and Zeyrekee in the same district. The Turks are totally unable to guard them, and the Koords defraud the revenue by filching their supplies from thence. In the Deyrsim Dagh, about Halooree Vank I saw fine copper strata; and near the old church, in the vicinity of some grots a tin deposit, which the natives take to be silver. The whole of the Deyrsim, included between the rocky barren ranges to north and south, is one vast forest, abounding in vegetable wealth, more particularly valonia, and the excrescence of the oak, called *hantoof*, used here in lieu of galls. The deep waters of the Mesoor intersect it, joining the Murad Su above Peyrtek, navigable at all seasons by large rafts, from its very sources in the fruitful Ovajik plain. By it the large timber of the hills, and grain and cotton from the highland valleys or plains, might be floated in any quantity to the southern districts, where they are comparatively rare and valuable. But the country inhabited by the semi-independent Kizzilbash is a *terra incognita* beyond the control of any power or law. Travelling is unsafe, and for the merchant impossible, yet at one time it was a common thoroughfare. Paved roads led directly between Aleppo and Erzeroom, and between Kharput and Trebizonde, over their wooded hills and magnificent highlands. They have been travelled and partially described by Europeans: but the Venetian Ambassador, Joseph Barbaro, was the last to profit by them; for although the paved traces of them exist, following a direct course through the Deyrsim, their usefulness ceased shortly after his time.

FOREIGN MINING AND METALLURGY.

We have some interesting statistics at hand in illustration of the mining and metallurgical production of Prussia in 1866. The statistics for 1867 not being yet made up, the figures which we now reproduce are the latest available :—

	Production.	Value.
Coal ..... Tons	18,628,548	£5,236,969 0 0
Lignite	4,900,432	688,848 0 0
Minerals of various kinds	—	1,584,931 0 0
Pig	730,815	2,756,908 0 0
Rough pig	45,636	214,808 0 0
Casting pig, first fusion	27,601	224,314 0 0
Heavy iron	387,409	3,792,945 0 0
Rough steel	29,253	432,675 0 0
Zinc	60,195	1,140,642 0 0
Silver	28	259,426 0 0
Lead and litharge	31,127	559,615 0 0
Copper	3,230	280,597 0 0
Nickel	—	55,890 0 0
Arsenic	—	1,695 0 0
Antimony	—	2,340 0 0
Mercury	—	197 0 0
Cadmium	—	28 0 0
Alum	—	19,659 0 0
Copperas	—	9,337 0 0
Sulphate of copper	—	4,008 0 0
Sulphur	—	1,511 0 0
Salt	246,890	241,470 0 0

The total value of the mining and metallurgical production of Prussia in 1866 was, therefore (massing the three totals of 7,510,748*l.*, 3,196,030*l.*, and 2,576,443*l.* together) 13,283,221*l.* The number of workmen engaged in 1866 in the Prussian mines of coal and lignites was 103,976; in the other Prussian mines, 44,323; and in the ironworks and saltworks, 81,305; making a total of 229,604.

With regard to the Belgian coal trade, it may be noted that the Minister of Public Works has justified the course which he pursued at a recent adjudication of contracts for coal required for the Belgian State Railways. The Minister states that the course pursued was adopted in order to break through an evident compact which coalowners had made among themselves. The Minister also explains why he accepted in the Liége basin prices which he refused in the Charleroi basin; account must be taken he says, of the cost of transport from the place of production to the station of consumption. M. Bivort, director of the Monceau-Fontaine and Martinet Company, offered to furnish three lots of ménu at 7*s.* per ton. Offers were made by MM. Jounlaux and Reul at the rate of 7*s.* 3d. per ton. Strengthened by the proposition made by M. Bivort, the administration replied to MM. Jounlaux and Reul that it would not treat on those terms only for the first four months of the year, and that it would not enter into arrangements for a whole year except at 7*s.* per ton. M. Reul agreed to deliver four lots on those terms, and subsequently M. Jounlaux came to a similar conclusion with respect to two lots. Only three lots then remained to be supplied, offers arrived to a still greater extent, and the coal in question was agreed to be supplied by the Trieu-Kaisin Company and the Bois-Delville Company, at 7*s.* per ton. The administration has thus completed its arrangements for the supply of coal for the Belgian State Railways during 1868. There has been a great stagnation observable during the last few days in the Belgian iron trade; current orders, which had arrived with tolerable regularity for some time, have now almost completely made default. One house in the Charleroi group has, however, concluded an order for 600 tons of commercial iron for Russia. But for the important order for rails secured recently by the Belgian Syndicate of Forgemasters for a Russian railway, it is affirmed that Belgian siderurgical industry might be pronounced as dull as it was during the greatest period of depression, in 1867 or 1866. A Charleroi paper states that the house of De Dorlodot has just decided on discharging 200 of its workpeople, while a rather important reduction is to be made in the wages of those who remain. This grave piece of intelligence requires confirmation, however, but it is asserted that in the Liége group several establishments have been making reductions in their workpeople and even in their employés. The administration of the Belgian State Railways will shortly submit to competition an important contract for Bessemer steel wheel-tyres. The concern known as the Company of Capitalists, United with a Mutual Industrial Object, has decl ared a dividend of 1*l.* per share as the second distribution for 1867. Meetings are announced as follows:—Haut Flénu Colliery Company, Feb. 8, at Jemmapes; Falnuée Colliery Company, Feb. 11, at Gand; and Haine St. Pierre Forges, Ironworks, and Foundries Company, Feb. 15, at Brussels.

During the first eleven months of 1867 the imports of pig duty free into France amounted to 49,592 tons, against 66,584 tons in the corresponding period of 1866, showing a decline to Nov. 30 last year of 16,992 tons. On the other hand, the imports of pig with payment of duties were 18,653 tons more in the first eleven months of 1867 than in the corresponding period of 1866, the figures being 77,421 tons and 58,768 tons respectively. As regards iron and plates, the imports free of duty were 58,000 tons in the first eleven months of 1867, showing an advance of 6500 tons upon the corresponding period of 1866; while the imports of those products with payment of duties only amounted to 6000 tons in the first eleven months of 1867, as compared with 8000 tons in the corresponding period of 1866. The total exports by warrants for pig iron and plates were 105,989 tons in the first eleven months of 1867, against 141,663 tons during the same period of 1866, showing a decline of nearly 36,000 tons last year. The direct exports of the same products also showed a decline in the first eleven months of 1867, having only amounted to 16,657 tons, against 19,200 tons in 1866. The imports of minerals into France during the first eleven months of 1867 were 470,770 tons, as compared with 422,639 tons in the corresponding period of 1866. Algeria furnished 162,000 tons of the total quantity of minerals imported in the first eleven months of 1867, against 100,000 tons in 1866, showing a remarkable increase in the deliveries of Algerian minerals last year. The adjudication of the Decazeville forges recently made to the Orleans Railway Company has been annulled, and a fresh adjudication was to take place on Thursday; the upset price has been increased by one-tenth—to 126,720*l.* The state of the French iron markets has not experienced any material variation. In the Moselle pig has been run off sluggishly, and prices have been sustained with difficulty. A report of the French Senate, on a petition presented by various ironmasters of the Nord, energetically rejects the protectionist arguments of the petitioners, and declares unmistakeably in favour of commercial liberty. Meetings are announced as follows:—French Tin Company (in liquidation), Jan. 31, at Paris; Maurienne Mines and Blast Furnaces Company, Feb. 15, at Paris; and Bank of Mines, Feb. 29, at Paris.

The tendency of the Havre copper market has improved, disposeable Chilian in bars having found purchasers for various lots at 70*l.* to 70*l.* 8*s.* per ton, Paris quotations. The other markets present scarcely any fact of striking interest; the article is almost generally maintained at former rates. At Rotterdam, Drontheim has made 50 fls. to 52 fls. At Amsterdam, Drontheim has made 50 fls.; English, 45 fls.; and Swedish, 50 fls. At Havre, Chilian in bars has made 70*l.* per ton; Peruvian mineral (pure standard), 73*l.*; United States (Baltimore), 80*l.* to 82*l.*; ditto Lake Superior, 80*l.* to 97*l.*; ditto Mexican and Plata in bars, 68*l.*; ditto red copper, 68*l.* to 69*l.*; ditto bronze, 66*l.* to 68*l.* per ton. At Paris, Chilian has been quoted at 70*l.*; and Corocoro mineral, 73*l.* per ton. On the Dutch markets the sales which have been effected of tin have been inconsiderable, and prices show a certain feebleness; 52¼ fls. to 52⅛ fls. has been paid for Banca, and a lot of 200 blocks to be obtained from the approaching public sales has been dealt in at 53 fls. As regards Billiton, 100 ingots have changed hands at 51¼ fls., and 500 ingots under sail at rates which have not transpired. On the French and German markets transactions are temporarily restricted, and prices are in consequence almost generally nominal. At Paris, Banca has made 94*l.*; Straits, 91*l.*; and English, 91*l.* 4*s.* per ton. At Havre, Banca has made 88*l.* to 90*l.*; Straits, 86*l.* to 88*l.*; and Peruvian, 82*l.* to 84*l.* per ton. Transactions in zinc have been of less importance at Hamburg and Breslau. The Vieille Montagne Company has just announced a reduction of tariff as regards its rolled zinc; the price has been fixed at 26*l.* per ton as regards Belgium, Holland, and Germany. At Paris, rough Silesian has made 21*l.* 12*s.*, and zinc from other sources 20*l.* 16*s.* per ton. Vieille Montagne rolled zinc stands at the price already indicated. There is little change to note in lead at Rotterdam; Stolberg has made 11¼ fls. At Paris, Spanish saumons have realised 19*l.* 4*s.*; French, 19*l.* 8*s.*; English, 19*l.* 4*s.*; and German, 19*l.* 12*s.* per ton. At Marseilles lead in saumons, first fusion, has made 18*l.* 6*s.*; ditto, second fusion, 18*l.* per ton. For consumption, lead in shot has made 19*l.* 16*s.*, and rolled and in pipes 21*l.* per ton.

The revenue of the Paris General Company for Lighting and Heating by Gas amounted, during December, to 169,302*l.*, as compared with 161,597*l.* in December, 1866, showing an increase of 7705*l.* For the whole of 1867 the receipts of the company were 1,328,094*l.*, as compared with 1,210,005*l.* in 1866, showing an increase of 118,089*l.*, or 9·76 per cent. The concern had attained a high degree of prosperity in 1866; in 1867 it went a further step in advance. Railway enterprise appears to continue to find favour in Germany. The shares of the Prague Iron Industry Company have risen to the extent of nearly 13 per cent., the iron trade of Austria and Hungary having received an impetus from the attention which is now being devoted in those kingdoms to the work of railway construction. The application of a new Customs tariff, which had occasioned some uneasiness to Russian industrials, has been adjourned to 1869.

Meetings of Public Companies.

THE NATIONAL BANK.

The thirty-third annual general meeting of shareholders was held at the Bank, Old Broad-street, on Tuesday,

Sir J. N. M'KENNA, M.P., in the chair.

Mr. MICHAEL JOSEPH POWER (the secretary) read the notice convening the meeting.

The report of the directors stated that in July last the directors submitted their report for the half-year ending June 30: the present statement incorporates the profit and loss account for the two half-years of 1867. The dividends and extra dividends payable for the year 1867 have been declared at the same rates as those paid for 1866.

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDING DEC. 31, 1867.

Jan.—Half-year's dividend at 8 per cent. per ann.	£60,000	0	0			
With extra dividend, 16*s.* per share	40,000	0	0 =	£100,000	0	0
July—Half-year's dividend at 8 per cent. per ann.	60,000	0	0			
With extra dividend, 16*s.* per share	40,000	0	0 =	100,000	0	0
Dec. 31—To balance, being the amount of rest at this date				543,889	13	9
Total				£743,889	13	9
Rest or undivided profits at Dec., 1866				£560,254	2	11
Net profit for the half-year to June 30 last	£101,338	10	5			
Net profit for the half-year to Dec. 31, 1867, after writing off all bad and providing for all doubtful debts	£93,045	0	5			
Less rebate of interest on bills not due	10,748	0	0 =	82,297	0	5 = 183,635	10	10
Total				£743,889	13	9

Since these accounts were made up a dividend at the rate of 8 per cent. per annum on the paid-up capital of the bank, and an extra dividend of 16*s.* per share, together 2*l.* per share, have been declared on the 50,000 shares which constitute the company's capital; and the same are now payable at the head offices and branches of the company. The dividend and extra dividend now payable for the half-year ending Dec. 31, 1867, amount together to 100,000*l.* The directors desire to state that the decrease in the profits of the half-year is solely due to the low rates which have prevailed for money, particularly on discounts and advances on securities in the City of London. The deposits and creditor balances of customers have increased in the year by 115,463*l.*, and the circulation is also slightly in excess of the amount at the close of 1866, showing that, notwithstanding the general stagnation of business, there is actual progress to record in some of the most important departments of the business of the bank. As the "rest," which is available to a reasonable extent to equalise dividends, has been considerably augmented on the average of the last four years, the directors, in view of exceptionally low rates of interest which have prevailed for the past half-year, do not consider it advisable to vary the ordinary dividend and extra dividend.

The CHAIRMAN, in moving the adoption of the report, addressed the meeting at some length. He said:—Gentlemen, when I had the honour of addressing you from this chair last year I ventured to say that the year 1866 was without any parallel in our experience. I may truly say of 1867 that, whilst it essentially differs in its character from 1866, it is equally without any parallel in the experience of the present generation of business men: 1866 was the year of a great financial crisis, a year of panic and embarrassment; 1867 was a year of exhaustion and depression. Those who are charged with the direction and management of a great company like ours cannot expect to escape those vicissitudes of commerce and finance which affect the community at large. The utmost we have a right to expect in such years as those we have passed through is that good management and attention should secure us from any positive reverse. I think I may with some confidence congratulate the proprietors that we have done much more than this. True it is we realised less profits in 1866 than in 1865, and less in 1867 than in 1866; but we have on the average of the last three years realised over 200,000*l.* per annum, and with this I think we should, under all the circumstances, be satisfied, particularly as these results were attained consistently with the maintenance of reserves in cash, which I venture to say, as compared to liabilities, exceed the proportion maintained by any other joint-stock bank in the empire. Of course, I do not include the Bank of England in this comparison, nor do I draw any individual comparison, but I say deliberately that I do not find in the whole list of banks whose accounts are published a single company whose cash resources bear so large a proportion to liabilities as those of the National Bank. This could not have been the case had we been straining for profits; but it is the case because we have deliberately postponed the consideration of profits to that of perfect security, relying on that policy as the soundest, and, in the long run, the best calculated to ensure your approval. (Hear, hear.) But, gentlemen, some proprietor may not unfairly ask what reason have we to hope that the profits in future years are likely to maintain the average of the past three? What reason is there to believe that the scale of 1867 may not itself be an average for future years? I will explain to you why I think we have a right to believe 1867 an exceptionally unfruitful year. The advances and investments of the bank yielding interest amounting in round figures to seven millions sterling, the amount due by the bank on which interest is paid does not amount to four millions—it scarcely exceeds 3,500,000*l.* But let us assume that to the extent of four millions the reduced rate of interest payable to depositors compensates us for a lower rate of interest on four millions of advances and investments, there then remains the sum of three millions which is not borrowed at interest, but which we employ at the best rates we can obtain; any alteration equivalent to an advance of 1 per cent. per annum in the average value of money should, therefore, improve our profits to the extent of 30,000*l.* a-year. (Hear.) Those who believe that the average value of money in the London money market will in future be from 1½ to 2 per cent. per annum only have equal grounds for believing that the profits of 1867 will not be exceeded in future years; but those who consider that the present rates of money are exceptional and abnormal have a right to expect that with a return to the usual rates for money an expansion of our profits must occur. Gentlemen, I need scarcely say that all these conditions of the future depend on circumstances far beyond our control; but whatever course business may take our duty will continue the same—to watch over your interests scrupulously and fearlessly to the best of our abilities, to keep continually subjecting the management of every office of the bank to the inspection of officers not responsible for the state of things reported on, but responsible only to make trustworthy and careful reports, to keep the proprietors informed not only of the actual state of the company, but also what its prospects are, according to the best of our judgment. Gentlemen, although the future is a sealed book the past is, in some sense, its index, and it is open and legible for our instruction. I cannot help in periods like the present referring to the past. In the year 1851 I was placed, by the favour and confidence of this board, in a position to establish a wholesome inspection and control over the bank business, then almost exclusively confined to Ireland. I claim for myself no exclusive credit for the progress of the bank since that year; but we may all well have pride in referring to it. The capital of the bank in that year was constituted of 20,000 shares, on which the sum of 22*l.* 10*s.* had been paid up, amounting, therefore, in the whole to 450,000*l.* The market value of the stock in 1851 was 17*l.* a share, equal to 340,000*l.* By patience, by prudence, with ordinary good fortune, the 20,000 shares, 22*l.* 10*s.* paid up, have grown, without the call of another pound from the original proprietors, into 25,000 shares, 30*l.* paid up on each, with a market value, even in this season of depression, of a million and a-half sterling. But, then, it may be said that we issued new shares at a premium so late as 1864, and the bank acquired a profit of 500,000*l.* by that operation; and it may be asked, is it not the profit on these new shares which has increased or maintained the value of the old. It may be so to some extent, but certainly not at the cost of the new shareholders. The 20,000 new shares, for which the bank received 1,100,000*l.*, are now represented (owing to the bonus addition of 1865) by 25,000 shares, value also for a million and a-half, showing beyond the possibility of question that these new shares have increased 400,000*l.* in value as compared to the issue price of 1864. (Hear, hear.) There are, however, some who ask why are not the shares as valuable in the market as they were in 1865 and 1866? To these I answer—Look around, examine the course of prices in other bank shares, and remember that this National Bank is not simply an English bank, nor simply an Irish bank—it has the preponderating advantages of being both; but it has also some disadvantages. English people became unnecessarily and unreasonably alarmed at Fenianism, and at a time when our cash reserves exceeded all proportion compared with those of English banks, it was believed in England the Fenian excitement would inflict serious damage upon us. In Ireland, on the other hand, idle and utterly unfounded rumours were circulated, some emanating from persons on this side of the water, that the bank was likely to lose large sums, not only by the Bank of Hindustan, but by other companies who were never our debtors for a single hour. (Cheers.) As I have mentioned the Bank of Hindustan, I will remind you that in the address which I had the honour to make to you last year from this chair on the subject of the accounts of that bank, I explained to you that the Bank of Hindustan remained indebted to the National Bank 856,000*l.*, against which we held certain securities. I have now the pleasure of stating that the total debt of the Bank of Hindustan has been reduced to 314,000*l.*, and that the prediction I made as to the complete safety of the debt will be fully verified. Gentlemen, I do not think I need trespass on your attention any longer. I will be happy before the meeting separates to answer, to the best of my ability, any questions or observations which may be made requiring explanation or reply, and I will conclude for the present by moving that the report which you have heard read be adopted by this meeting, printed, and circulated amongst the proprietors. (Cheers.)

Mr. ALBERT RICARDO had much pleasure in seconding the resolution.

A SHAREHOLDER handed in a series of questions, which he requested should be read.—The CHAIRMAN said that it was not usual at their meetings to hand in a series of written questions without notice, although he had no objection to their being read.—The SHAREHOLDER then proceeded to read the questions, and to comment upon them. He concluded by moving an amendment, to the effect that the report and balance-sheet be not adopted until audited by an auditor appointed in compliance with the provisions of an Act of Parliament (from which he quoted).—The CHAIRMAN having asked two or three times if any proprietor would second the amendment, and no reply being made, said he would test the matter by seconding it himself. He stated that in the series of questions, which were intertwined and interlaced with a written speech, there was not a single fact that had anything whatever to do with the adoption of the report. The allegations in the questions were unfounded, and the shareholder who had made them had upon a previous occasion brought forward all sorts of charges of fraud against the directors and officers of the bank, had filed a bill in Chancery, and afterwards wished to withdraw it, but that the directors refused to allow him to do so, and having rebutted his own statements upon oath, the bill was dismissed with costs.

Upon the question being put, the only hand held up in favour of the amendment was that of the mover, when the resolution was put and carried with but one dissentient.

Mr. ALBERT RICARDO, as one of the auditors, wished to say that he had spent many days in the examination of the whole of the accounts. He had been to the Bank of England, and had checked all the securities, and was now prepared to confirm the correctness of the statement attached to his name at the foot of the balance-sheet.

The retiring directors, Messrs. James Bogle Smith, Frazer Bradshaw Henshaw, and Sir Joseph Neale McKenna, M.P., were unanimously re-elected. The election of Admiral Sir Burton MacNamara, Mr. Peter McEvoy Gartlan, and the Honourable Albert Henry Petre as directors was confirmed.

Upon the motion of Sir B. MORRIS, seconded by Mr. FOX, a cordial vote of thanks was passed to the Chairman and directors.

The meeting then separated.

EBURY LEAD MINING COMPANY (LIMITED).

The first ordinary general meeting of shareholders was held at the offices of the company, 12, Old Jewry-chambers, on Tuesday,

Mr. THOMAS THOMPSON (managing director) in the chair.

The notice convening the meeting having been read, the report of the directors was read, as follows :—

The directors have called this the first general meeting of the shareholders in the company at this early period, in consequence of a clause in an Act passed during the last session of Parliament, which requires that the first meeting of every company shall be held within four months of its registration. Beyond the reports of the agents, however, the directors have little to communicate. Up to the present time the sum expended upon the mine has been about 120*l.* only. The first moiety, 3000*l.*, of the purchase-money has been paid to the Westminster Company, and to meet the second moiety the directors have this day made a call of 10*s.* per share, payable on or before Feb. 14 next. A short time ago the mine was inspected by Capt. Northey, of Bwlch Consols, who expressed himself highly pleased with the property, and whose report will be laid before the meeting. Since Capt. Northey's visit an important change has taken place in the shaft, to the sinking of which the present operations are chiefly confined. The shaft has for some time been passing through a bar of hard ground, left by the old workers. The lode is now opening out, has entirely changed its character, and is worth over half a ton of lead ore per fathom, some splendid specimens of which will be shown to the meeting. There can be but little doubt that there is at Ebury a first-class mine, and the directors have every reason to believe one that will shortly enter the Dividend List. The whole of the directors retire from office, in accordance with a clause in the Articles of Association, but are eligible, and offer themselves for re-election.

The following reports from Capt. Northey, of Bwlch Consols, and Capt. F. Evans, the agent at the mine, were then read :—

Jan. 18.—I find this mine is situate to the east of and on the main lodes of the Westminster Mines; the sett is of considerable length, and equal to what may be required to make a large mine. It contains several east and west and north and south lodes. The operations on these lodes have hitherto been carried on without the aid of any machinery, and at present the whole mine is drained by natural fissures, called swallows, so that the sinking of the mine without water is of the greatest importance to the company, and will contribute greatly to its success. Evans's shaft, sinking below the 40, is going down on a lode about 2 or 3 ft. wide. Its present depth is somewhere about the 50; but I would recommend it to be sunk a little deeper before driving out, as the lode improves for lead, and is of the most promising description. The old workings in the 40 east and west of this shaft, are very considerable, and no doubt large quantities of ore have been raised out of them; and the sinking of Evans's shaft, and the driving out and cross-cutting of these lodes from it will, in my opinion, open out a productive mine—at least there is every appearance at present that wound lead every practical person to that conclusion. The mine adjoins the Halkyn Deep Level Company, which is drained by a deep adit, 120 fms. below the surface. It is on the same limestone measures which a little to the east, I am informed, produced rich mines; considering, therefore, that the mine is dry, and that it can be cheaply worked, with lodes producing ore, I can only say it is a speculation of no ordinary kind, and that the chances are greatly in favour of soon making discoveries of value; in fact, the lode now being sunk on in the bottom of Evans's shaft is producing excellent stones of ore.—R. NORTHEY.

Jan. 27.—The lode at Evans's shaft, sinking below the 40 fathom level, is improving in size and character, with a regular leader of lead ore coming in, worth over ½ ton per fathom; the nature and composition of this lode is, in all respects, similar to that of the Westminster Mine, and is one of its main lodes, and I should say we are now getting into a run of ore of value. There are large and exclusive workings in this lode east and west of Evans's shaft, and well-known runs of ore are worked below the 40 fathom level. There is every reason, therefore, to believe that the sinking of this shaft will open valuable and extensive lead ground. We have a long line on the several lodes, and the whole are drained by swallows or natural drains in the limestone, allowing the mine to be worked dry, and without the aid of machinery, except for winding and crushing the ores. The ore now being raised is solid, and of excellent quality; and, should the ore ground now being opened by means of Evans's shaft turn out as may be expected, the mine will soon be placed in a position to give sales of lead ore, and, in my opinion, a very valuable property be secured. The lodes of the mine are well known for producing large quantities of lead ore, and situate in the richest limestone measures of the district for that mineral, and it does seem only a question of opening on those lodes to produce a rich mine. This we shall do by sinking Evans's shaft, and driving east and west from it. We know there is an intersection of several lodes immediately west of said shaft, and believe that by working as advised we shall soon find ourselves in possession of a mine of great value.—F. EVANS.

The CHAIRMAN said that, in addition to the reports, there was very little to communicate, but he was glad that the shareholders should have an opportunity of seeing those magnificent stones of ore from the bottom of the shaft, which had arrived from the mine only the day before. Finer stones of ore he never saw come from any lead mine. He was well assured when they commenced operations that they would have but a short way to go to find ore in paying quantities, and his anticipations had been realised. It had been intended to drive out levels east and west at the 50, but in consequence of the improvement in the bottom of the shaft, Capt. Evans had decided to continue the sinking a few fathoms further, and then drive out. The shareholders must remember that they might calculate upon sinking a dry mine for the next 60 fms., and the ground being easy, and the dressing cost very small, it did not require large quantities of ore to make a paying mine. He then moved the adoption of the reports in the usual way.

Mr. BATTERS: I see Capt. Evans values the lode at over ½ ton per fathom; this, if it continues, will more than pay cost, and any increase in the value of the lode will pay good profits. In a letter to the Chairman I observe Captain Evans says he may with the greatest confidence speak well of the mine.

The CHAIRMAN: An average run of ore ground, worth 1 ton per fathom, will pay good profits, but there can be no reason why we should not have ground worth 2, 3, and 4 tons per fathom, as at Westminster; and, looking at the easy ground, and the facility with which the mine can be opened, it ought not to be long before it pays well.

Mr. BATTERS: We may even look for richer ground at Ebury than at Westminster, as it is to the eastward of that mine, and nearer the coal measures. There can be no question but that we have here one of the most valuable mines in the country.—The motion for the adoption of the reports was then carried, and the retiring directors were re-elected for the ensuing year.

A vote of thanks to the Chairman terminated the proceedings.

THE ROYAL COPPER MINES OF COBRE.

The half-yearly general meeting of shareholders was held on Thursday. The report of the directors stated that during the past year several general meetings were held, when from time to time it was decided to carry on the works at the mines upon the reduced scale of operations, as recommended by Mr. Clemes, partly with a view of retaining legal possession of the company's property until the long-pending suit with the Cobre Railway Company should have been decided, or a settlement of all differences between the two companies arrived at. On Dec. 17 a decision was obtained at Havana, dismissing the appeal of the railway company, and confirm-

ing the decree of the Captain-General, of Aug. 30, 1863, pronounced in favour of this company. The result of this decision is that the contract between this company und the railway company is declared void, and the latter company is now to frame a new tariff for the approval of the Government in accordance with the railway laws of 1842 and 1858. The terms of the original contract were that this company should pay $6¼ per ton of 21 cwts. for the carriage of ores, and $4 per ton of 20 cwts. for supplies. Previously to the decision, the railway company had reduced the charge upon the ores to $5 per ton, dating from Jan. 1, 1867, and they have subsequently intimated their readiness to make a further reduction of $1 per ton, thereby fixing the tariff at $4 per ton, subject, however, to certain conditions. These conditions the directors have not accepted, but they have instructed their agent in Cuba to agree to the tariff of $4 per ton, provided the same is applied equally to ores and supplies of 21 cwts. each to the ton, and also that a return be made by the railway company on account of the excess paid since the date of the Captain-General's decree. In consequence of the very limited works at the mines, the results have not been great, the ores raised to the end of November amounting only to 4614 tons of shippable ores of an average of 16¾ per cent., and 2704 tons of poor ores and slimes, available for smelting, of an average of 6¾ per cent. These ores, as far as already sold, have realised on an average 14s. 2½d. per unit. In consequence of the difficulty of obtaining sufficient supplies of coals, the make of regulus has only reached 176 tons, of a percentage of 32½. At the end of November their were sufficient ores on the mines to load two vessels, and a stock of poor ores sufficient to produce 366 tons of regulus. An estimate of the operations of the company for the past year is submitted to the shareholders, the result of which, showing a loss of 3911*l.* 13s. 8d. on the working of the mines, the board cannot but consider as unsatisfactory, especially with regard to the financial position of the company. It should be noticed, however, that the above loss is reduced by the profit on the Swansea agency, as seen by the figures given. The board have been able to make some diminution in the expenses of the company by the reduction of salaries to the amount of 725*l.* They are also in treaty for the letting of some portion of the company's offices. There are now 10,718 shares on the register, leaving 1282 unregistered scrip shares held by parties who have not yet registered. Mr. Clemes has arrived in this country, and his report will be submitted at the meeting.—The meeting was adjourned till Thursday, when Mr. Clemes' report will be submitted.

LUCY PHILLIPS GOLD AND SILVER MINING COMPANY.

The second general meeting of shareholders will be held on Monday.

The report to be submitted states that the financial manager, considering it was impracticable to get the machinery to the mines, as he was anxious to do, before the winter set in, has not risked the expenses and contingencies of an unsuccesful proceeding, but has judiciously stored the machinery at Umatilla for the winter, and has entered into a satisfactory contract with responsible carriers for the transport of the machinery and its due delivery at the mine in good working order during the ensuing season. This contract he has been able to effect on more favourable terms than could have been obtained during the past season. The propriety and desirableness of this arrangement will, perhaps, be more evident when it is mentioned that the machinery referred to by Captain James, as being forwarded whilst he was in Idaho, had failed to reach the mines for which it was intended; and the manager calculated that he might, after all, arrive during the coming season as soon or sooner than this party, who had several months' previous start. It will, doubtless, be in the recollection of the shareholders that, whilst a portion of the mountain roads is impracticable during the winter months, there is no impediment to prevent the carrying on the operations at the mines during the winter when once the machinery is there. For the successful realisation of this important object, the shareholders have only to wait the return of open roads, and the directors are happy to assure their co-adventurers that they continue to hold unaltered the opinion already expressed as to the eventual satisfactory working of the mine, based, as it is, on the judgment and reports of experienced and respectable men. The manager's last advices referred to the favourable accounts he received of the district; and that no enterprise in that direction had been unsuccessful, with adequate capital for working.

VANCOUVER COAL, MINING, AND LAND COMPANY.

The adjourned general meeting of shareholders will be held on Tuesday. The report to be submitted states that, although the shipments of coal for the six months have been slightly in excess of those for the same period of the previous year, yet the sales have not been such as to realise the anticipations expressed by the directors in their last report. The difficulty then referred to, of procuring lower rates of freight, still existed; and owing to the very abundant harvest and enormous exportation of wheat from California, a large importation of coal from Australia prevailed. The percentage which has been hitherto deducted for depreciation has been very largely increased for this half-year, Mr. Wild having considered that certain items, formerly appearing in the inventory, should be struck out as altogether valueless, and that upon others too great a value had been placed; and, therefore, this charge, under the head of depreciation, amounts in the present profit and loss account to 3144*l.* 5s. 5d. The directors are further advised that they can no longer retain in the stock accounts at their former valuation certain goods, stores, plant, and barges. From the sum at which they have been previously valued 1539*l.* 7s. 10d. has been deducted, and the reserve fund reduced by this amount. On the transfer of the property from the Hudson's Bay Company in 1862 certain debts in the colony were assumed by the manager, which the directors were led to believe were good. Some of them are now ascertained to be irrecoverable, as well as some others arising out of the subsequent four years' trading. It has, therefore, been decided to write off 1318*l.* 14s. 2d. for bad debts, and the reserve fund has been further reduced to that extent. The directors have also written off to this fund 1329*l.* 5s. 8d., an amount previously assumed to be recoverable from the purchasers of land, but whose lots, on their failure to complete, have now reverted to the company. The further sum of 500*l.* has also been deducted and written off from preliminary expenses: 4590*l.* 11s. 5d., appearing as an asset under the head of "Fideliter," in the last half-yearly balance-sheet, is now placed at 3861*l.* 9s. 2d., being the company's claim against the underwriters, as rectified by the average stater, and a portion of this difference, amounting to 669*l.* 3s. 6d., has been deducted from the reserve fund. The directors regret that they are not in a position to report the final settlement of this claim. Since June 30 the directors have paid 3891*l.* 4s. 9d. to the Hudson's Bay Company, on account of the mortgage debt, which is now reduced to 10,000*l.*

The balance of 4190*l.* 7s. 3d. appears to the credit of profit and loss on June 30, but the directors do not consider this sum available for dividend, because they have ascertained that there are still some items on the credit side of the balance-sheet which are liable to reduction. They, however, recommend that a dividend of 3s. 6d. per share be paid, free of income tax, on the ordinary shares, and rateably on the paid-up shares, which will exhaust 2409*l.* 3s. 4d., and that the balance be carried forward to the credit of the next account. A comparative statement of coal sales shows—For the six months ending June 30, 1863, 8704 tons; 1864, 15,522 tons; 1865, 12,824 tons; 1866, 13,113 tons; 1867, 16,438 tons. For the six months ending December 31, 1863, 12,690 tons; 1864, 13,110 tons; 1865, 19,995 tons; and 1866, 12,002 tons. Total, in 1863, 21,394 tons; in 1864, 28,632 tons; in 1865, 32,819 tons; and in 1866, 25,115 tons.

[For remainder of Meetings see to-day's Journal.]

FOREIGN MINES.

ALAMILLOS.—Jan. 21: The 3d level, east of La Magdalena shaft, produces 1 ton of lead ore per fathom; a very kindly lode. The 4th level, east of La Magdalena shaft, yields 1 ton of ore per fm.; within the past week the lode has become small, and the ground hard for driving. In the 4th level, west of La Magdalena shaft, the lode, which has declined in value, and become small, produces 1¼ ton of ore per fm; the ground is good. In the 3d level, east of San Enrique shaft, the lode is destroyed by cross-heads, and the granite is of a harder nature. The ground in the 4th level, east of Taylor's shaft, is hard, and the lode very small. The 4th level, west of San Adriano shaft, contains a large lode, with spots of lead occasionally. The 3d level, west of San Yago shaft, produces 1 ton of ore per fm.; this is being driven through a fine looking lode, which we expect will improve shortly. The lode in the 3d level, east of Crosby's cross-cut, is not well defined, being split into several branches; the ground is hard. The lode in the 2d level, west of Crosby's cross-cut, produces 1¼ ton per fm.; this is opening at present some good tribute ground.—Shafts and Winzes: The lode at Taylor's engine-shaft, below the 4th level, is very strong, producing 1 ton of ore per fm. Fernando's winze and Berdu's winze, below the 3d level, produce respectively 1 and 1½ ton of ore per fathom.

FORTUNA.—Jan. 18: Canada Incosa Mine: In the 100 fm. level, west of O'Shea's shaft, the stuff has been drawn away, and the driving resumed. The lode in the 90, west of Judd's shaft, is regular, having a very kindly aspect, and producing 1½ ton of lead ore per fm. The lode in the 80, west of Judd's shaft, produces ½ ton per fm. The 70, east of Carro's shaft, yields 1½ ton per fathom; this end is opening a good piece of ore ground, and our prospects are good. We have put the men who were in the 55, east of Carro's shaft, to cross-cut south to hole to the 55, west of St. Tomas.—South Lode: In the 50, east of Gill's winze, the lode is large, producing ½ ton per fm. The 50, west of Gill's winze, also produces ½ ton of ore per fm. The lode here is very changeable in character; at present it is small, and not so kindly as it has been. The 40, west of San Pedro shaft, produces ½ ton of ore per fm.; this level is not answering our expectations, but the lode is large, composed of quartz and lead ore. Gill's winze, sinking below the 30, yields ½ ton of ore per fm.; good progress is being made in this sink.—Los Salidos Mine: No change has taken place in the 100, west of Morris's engine-shaft, since our last report. The lode in the 90, west of Morris's, is small and valueless. The 75, west of Buenos Amigos shaft, produces 2 tons of ore per fm.; the lode is divided into three distinct branches, each containing lead, intermixed with quartz. The lode in the 65, west of San Carlos, has of late greatly diminished in size and value. In the 100, east of Morris's engine-shaft, our driving having been extended on the south part of the lode, we have commenced cross-cutting north, to communicate with Gonzale's winze. The 90, east of Cox's shaft, produces 2¼ tons of ore per fathom; this is opening a splendid piece of tribute ground. In the 75, east of Cox's, we are pursuing a northern direction, where we expect to find more of the lode. The 65, east of San Miguel shaft, is without change.—Shafts and Winzes: San Pablo's shaft, below the 65, produces 2 tons of ore per fathom; this shaft will have been sunk to the required depth for the 75 fathom level by the end of the month. Buenos Amigos shaft yields 1½ ton of ore per fathom; the men are making good progress here. The lode in Carracosa's winze, below the 75, is regular, compact, and kindly, producing 2 tons of lead ore per fathom.

LINARES.—Jan. 18: West of Engine-Shaft—South Lode: The lode in the 110, driving west of No. 152 winze, is poor; ground wet and difficult for driving through. In the 75, west of Warne's engine-shaft, the lode is large and open, consisting of quartz and carbonate of lime, and producing 1 ton of lead ore per fathom. The 75, east of Crosby's engine-shaft, produces 1 ton per fm. The 31, east of San Francisco's shaft, also produces 1 ton of ore per fathom.—East of Engine-Shaft: The lode in the 95, east of Taylor's cross-cut, is very large and kindly, producing 1½ ton of ore per fathom.—North Lode: The 95, east of Taylor's shaft, yields ½ ton of ore per fathom; the lode is very open and easy for driving. The 95, east of No. 154 winze, produces 1½ ton of ore per fm.; this end is opening a good piece of tribute ground.—Shafts and Winzes: The sinking of Warne's engine-shaft below the 75 has been delayed, owing to the breaking of the nose-plate and pin of the bob, which are, however, now repaired, and set to work. The water will be in fork in a few days, when sinking will be resumed. No. 155 winze, below the 61, produces 1½ ton per fathom. No. 156 winze, below the 61, also yields 1½ ton per fathom.

UNITED MEXICAN.—Guanaxuato, Dec. 21: Mine of Jesus Maria y Jose: In this mine there is no change, except a slight improvement in pozo No. 3 of the "planes" (deepest workings), in which some good ore, though in a narrow strip, has been found. We are driving on the pozo De Quai by destajo (contract work), so as to get a greater depth in it than in the other pozos, in the hope of freeing them from water, and working with more ease on the ore. In the reserves we have the usual number of herramientas at work, and for the last month our extraction has been heavy; but, with an increased stock in the haciendas, and no immediate want of ore, I have thought it advisable to suspend work in San Nicolas and San Andre, in order to be able to fill up and secure the ground. We have fewer buscones than usual in the mine, as many have gone off to some neighbouring mines, and others to the yearly fair of San Juan de los Lagos, but the small number has been compensated for by an improvement in some of the ore. The buscone sales for the five weeks ending Dec. 19 amounted to $9326. The accounts for the month show a small profit of $529.—Mines in the Guadalupe de la Oscura District: In the outside workings of El Carmen we have some good but narrow ore. The communication of El Progreso with El Oro shaft being made, we have timbered the mouth of the latter, and have put up a small whim to clear the shaft and get ventilation, to enable us to get in the old mine. The timbering is already completed; the whim will be going next week. In Encinillas we have several cheap destajos at work, and are clearing the shaft slowly. The memoria (mine outlay) is somewhat high, on account of the work in El Oro being included in it. El Oro being in Encinillas ground, and when a communication is made from the surface the "labores salides" (outside works) will revert to Encinillas Mine. The want of workmen is much felt in this district, but as soon as we get ventilation we shall advance on the El Oro ground, and, as the mine must be of some extent, I sincerely trust that some discovery may be made. The buscone sales for the five weeks ending Dec. 18, 1867, amounted to $922.

MARIQUITA.—Bogota, Dec. 17: From Mr. Bull's reports respecting the cost of extraction of mineral compared with the value of the returns, showing a continued loss, and there being no hopes of immediate alteration in the state of things, I have given instructions to stop drawing mineral, and to sink the shaft and cross-cut under the lode, as from all appearance the saving by doing this will not only pay the expense of such work, but will enable the extraction afterwards, so that it will leave a profit. The establishment is being reduced to the staff absolutely necessary for the contemplated works and no more. The superintendent writes, under date Dec. 18—Mine: I am glad to be able to report well now upon the appearance of the mine. Last month the north part of the lode in the 120 appeared to be a little disordered; it is now, however, looking as solid as ever, and yielding ore of better quality. In the 90 fm. level end, south of Illingworth's shaft, there is a branch of excellent mineral.—Marmata Mines for the month of November: Cost, $11,061; returns, $11,460. The yield of gold is about the same as for the last month, which is owing chiefly to the causes alluded to in the last minutes, no mineral having been obtained from the Aguaental stations, there having been a scarcity of water to the mills.—Aguas Claras for the month of November: Export ore, value $5817.

FRONTINO AND BOLIVIA.—The directors have received advices from their superintendent, Mr. Rouch, dated Medellin, Dec. 14, together with a remittance of gold of the estimated value of 900*l.*—Bolivia: Juan Criollo Mine: Mr. Rouch states—"This mine still goes on satisfactorily, although the terrible sickness among the men threw us back a good deal, but, fortunately, this was compensated by an increase in the richness of the ore, so that with a very little over 100*l.* cost for the month we got 14 Spanish pounds (or 208 ozs.) of gold dust, value (say) 440*l.* At the La Salada Mine the new 12-head water-mill is now finished, as well as the railroad leading to it, so we may look to a large diminution of costs, and an increase of produce. The establishment will ultimately be the centre of an exceedingly rich group of lodes, the minerals of which will be brought to the mills on railways. At the Maria Dama Mine the lode has become poor lately, but Mr. Grieff is opening on some new lodes there, which we expect will be giving good ore to the mill in February, and there is, of course, the hope of the original lode improving also, as it has done on former occasions." The entire cost of the Bolivia Mines for the month ending Nov. 20 is 631*l.* 15s. 2d., and the produce 287½ ozs. of gold dust, of the estimated value of 634*l.*—Frontino: This mine is being worked on a small scale, and shows an expenditure of 112*l.* 5s. 8d.; value of produce, 133*l.*

CAPULA.—Capt. Paull, Dec. 26: The machinery will all be taken out during the ensuing month. I have engaged the best Mexican masons that can be got to build the engine-house, &c., which, I trust, will be completed in February next. The torta of 127 cargas, sent to San Cayetano hacienda, is incorporated at last; it is full three weeks that they told me that the salt would be there in a day or two, but it appears that, owing to the late rains, the arricros have not been able to pass the rivers coming from Tampico. I have sent the sample of the torta to Real del Monte to be assayed, but I shall not be able to know the result before to-morrow; the average mine assay will make it 46 marcs per monton, but we always allow something less for the metal after it is ground. When the partido question is settled, we shall immediately put all the men we can to work on metal, and raise, I hope, sufficient to pay the cost of the mines.

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CORNISH AND DEVON MINES.

Shares.	Names of Mines.	Amount Paid.	Dividend per share.	Total Amount.	Metal.	Parish.	Purser or Secretary.	Address.	System.	Copper.	Tin.	Lead.	Total Amount of Money.	Lease granted.	Dues.
										Tons.	Tons.	Tons.	£. s. d.		
4000	Brookwood	£ 1 11 0	£ 0 5 0	£ 500 0 0	Copper	Buckfastleigh			Cost-book	—	—	—			
509	Creegbrawse	—	1 0 0	509 0 0	Tin	Keuwyn			ditto	—	—	—	5,664 0 0		1-18
1024	Devon Great Consols	1 0 0	39 0 0	39,936 0 0	Copper	Tavistock	A. Allen	Gresham House, E.C.	Joint-stock	20,067	—	—	94,510 0 0	finish 1880	1-12
656	Ding Dong	49 14 6	0 10 0	328 0 0	Tin	Gulval			Cost-book	—	—	—			
358	Dolcoath	128 17 6	19 0 0	6,802 0 0	Copper and tin	Camborne	C. Thomas	Camborne	ditto	1245*l.*	502153/4*l.*	—	51,461 5 5*		1-24
6144	East Caradon	2 14 6	0 6 0	1,843 4 0	Copper	Linkinhorne	C. R. Norton	Salisbury	ditto	328§	—	—	12,975 0 0	1867 .. 21	1-18
128	East Pool	24 5 0	25 0 0	3,200 0 0	Tin and copper	Illogan	W. Prisk	Camborne	ditto	1558	337	—	20,940 0 0†		1029*l.*
1906	East Lovell	3 9 0	1 4 2	2,303 1 8	Tin	Wendron	H. Rogers	Helston	ditto	—	140	—	7,527 0 0		1-18
5908	Great Wheal Vor	40 0 0	1 10 0	8,862 0 0	Tin and copper	Breage	G. Noakes, man. dir.	Gresham House, E.C.	ditto	—	658½	—	37,002 0 0	.. 21	1-18
1024	Herodsfoot	8 10 0	4 10 0	4,608 0 0	Lead	Menheniot	T. Trevillion	Liskeard	ditto	—	—	540⅛	12,021 15 0	1866 .. 21	1-15
9000	Marke Valley	4 10 6	0 12 0	5,400 0 0	Copper	Caradon	J. Harding	Salisbury	ditto	5351	—	—	20,491 0 0	1851 .. 21	1-18
12800	Prince of Wales	0 12 6	0 3 6	2,240 0 0	Copper	Calstock	J. Hitchins	St. Michael's-alley, E.C.	ditto	1213	—	—	8,749 0 0	21	1-18
6000	Prosper United	8 14 0	0 5 0	1,500 0 0	Tin and copper	St. Hilary	C. Wescomb	Exeter	ditto	—	—	—			
1120	Providence	10 6 7	2 5 0	2,520 0 0	Tin	Uny Lelant	S. Higgs	Penzance	ditto	—	383½	—	19,627 15 8		
512	South Caradon	1 5 0	35 0 0	17,920 0 0	Copper	St. Cleer	T. Kittow	Liskeard	ditto	6053	—	—	52,222 0 0		1-15
496	South Frances	18 18 9	2 0 0	992 0 0	Copper	Illogan	W. Pascoe	Camborne	ditto	9457¾*l.*	835½*l.*	—	10,343 6 0		1-15
6000	Tincroft	9 0 0	1 0 0	6,000 0 0	Copper and tin	Pool	W. Teague	Camborne	ditto	74*l.* 6s.	393	—	21,512 0 0	21	1-26
2000	Trumpet Consols	11 10 0	1 0 0	2,000 0 0	Tin	Helston	H. Rogers	Helston	ditto	—	—	—			
3000	West Chiverton	10 0 0	8 0 0	24,000 0 0	Lead	Perranzabuloe	R. Clogg	Liskeard	ditto	—	—	3972	58,205 0 0‡	1855 .. 21	1-15
400	West Seton	47 10 0	20 10 0	8,200 0 0	Copper	Camborne	B. Matthews	St. Day, Scorrier	ditto	34,594*l.*	—	—	34,594 0 0	To run 20	
512	Wheal Basset	5 2 6	7 0 0	3,584 0 0	Copper	Illogan	F. W. Dabb	Redruth	ditto	1714	293	—	25,182 0 0	1850 .. 21	1524¶
4295	Wh. Kitty (St. Ag.)	5 4 6	0 4 0	859 0 0	Tin	St. Agnes	E. King	Austinfriars, E.C.	ditto	81*l.*	9520*l.*	—	9,601 0 0		1-22
1024	Wheal Mary Ann	8 0 0	3 0 0	3,072 0 0	Lead	Menheniot	P. Clymo	Liskeard	ditto	—	—	997	20,854 0 0		
396	Wheal Seton	58 10 0	17 0 0	6,732 0 0	Copper and tin	Camborne	H. Tilly	Falmouth	ditto	19812¼*l.*	2433½*l.*	—	22,403 1 1§		
1040	Wheal Trelawny	5 17 0	0 14 0	728 0 0	Lead	Liskeard	W. J. Lavington	Bishopsgate-street, E.C.	ditto	—	—	872½	18,769 10 6		
5000	West Godolphin	0 1 0	0 2 0	500 0 0	Copper and tin	Perranzabuloe	C. Thomas	Great St. Helens, E.C.	ditto	—	—	—			

* This amount includes 24*l.* 15s. 3d. for arsenic.
† This amount includes wolfram 10 tons 10 cwts.; arsenic, 244 tons.
‡ This amount includes sale of 244 tons of blende.
§ This amount includes 157*l.* 3s. 9d. for arsenic.
‖ This amount includes 100 tons of mundic. Have since made a call of 1*l.*
¶ 1-15th for copper, 1-24th for tin.

WELSH MINES, &c.

1000	Bronfloyd	£12 0 0	£ 1 6 0	£1,300 0 0	Lead	Cardigan	J. B. Balcombe	Aberystwith	Limited 15*l.*	—	—	370	£4,890 0 0	28	1-14
867	Cwm Erfin	7 10 0	4 0 0	3,468 0 0	Lead	Cardigan	J. Taylor and Sons	6, Queen-street-place, E.C	Cost-book	—	—	607	9,735 0 0		
128	Cwmystwith	60 0 0	12 0 0	1,536 0 0	Lead	Cardigan	J. Taylor and Sons	6, Queen-street-place, E.C	ditto	—	—	849	10,319 0 0		
300	East Darren	32 0 0	14 0 0	4,200 0 0	Lead	Cardigan	J. Taylor and Sons	6, Queen-street-place, E.C	ditto	—	—	913	14,644 0 0		
400	Lisburne	18 15 0	18 0 0	7,200 0 0	Lead	Cardigan	J. Taylor and Sons	6, Queen-street-place, E.C	ditto	—	—	3218	42,364 0 0		
3000	Maes-y-Safn	20 0 0	2 0 0	6,000 0 0	Lead	Flint	J. Taylor and Sons	6, Queen-street-place, E.C	ditto	—	—	2320	29,577 0 0		
1800	Minera	25 0 0	18 5 0	32,800 0 0	Lead	Wrexham	J. Frazer	Wrexham	Joint-stock	—	—				
6000	South Darren	3 6 6	0 3 0	900 0 0	Lead	Cardigan	J. H. Murchison	Austinfriars, E.C.	Limited	—	—				

CUMBERLAND, ISLE OF MAN, IRELAND, &c.

1500	Alderley Edge	£ 10 0 0	£ 0 10 0	£ 750 0 0	Copper	Cheshire	John Lawton	Alderley Edge, Cheshire	Joint-stock	184	—	—	£12,077 0 0	1859 .. 10	
280	Derwent	300 0 0	5 0 0	1,440 0 0	Silver-lead	Durham	J. Taylor and Sons	6, Queen-street-place, E.C	Cost-book	—	—			21	
2800	Foxdale	25 0 0	1 0 0	2,800 0 0	Lead	Isle of Man	J. Dixon	Chester	Limited	—	—				
15000	Great Laxey	4 0 0	2 0 0	30,000 0 0	Lead	Isle of Man		Sherborne-lane, E.C.	ditto		—				
508	Summer Hill	3 13 6	0 17 6	1,866 18 0	Lead	Mold	E. S. Hale	Gleave-street, Liverpool		—	—				
3000	Whitewell	0 5 0	1 0 0	3,000 0 0	Lead	Bewland		West Riding of York		—	—	690	8,183 0 0	40	1-12
17000	Wicklow	2 10 0	1 15 0	29,750 0 0	Copper and iron	Ballymurtagh, Ovoca	W. S. Kildahl	113, Grafton-st., Dublin	Joint-stock	1212	—		61,942 0 0*	held in fee.	none
20000	Min. Co. of Ireland.	7 0 0		15,508 8 9	Copper, lead, coal	Ireland	R. Heron	Low. Ormond Quay, Dublin	Limited	5354	—	1693	55,000 0 0		

* This amount includes 47,800 tons of pyrites and 3,500 tons of iron ore.

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